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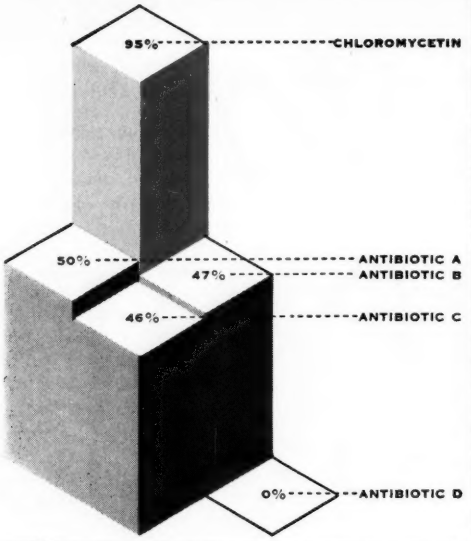
SENSITIVITY OF COMMON PATHOGENS TO CHLOROMYCETIN AND FOUR OTHER MAJOR ANTIBIOTIC AGENTS*



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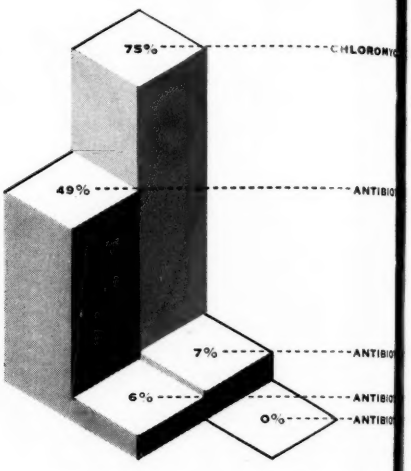

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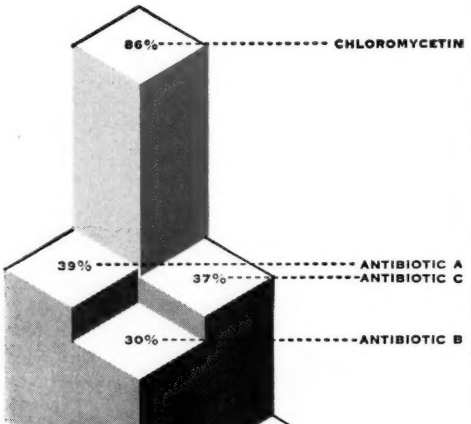

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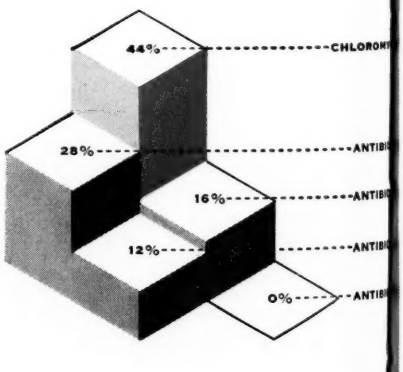

*This graph, based on *in vitro*
is adapted from Horton and

Original Contributions

The Patient Who Won't Get Well

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SOME day an archeologist digging in the ashes of a long forgotten city of yesteryear may come across the tablets which made up the medical school library in the university of that city. I feel sure that among these ancient records would be accounts of the kind of patient we will talk about today. Psychoneurosis is as old as the human race in all probability, and it is one form of neurotic personality disorder that occurs in the patient who won't get well. Ever since there have been sick human beings and medicine men to look after them, this group of patients has been, I suspect, most difficult for the physician to understand, quite often difficult to the point of impossibility.

The group of patients who demonstrate this neurotic opposition to recovery is not large. This is fortunate, because if such problems were frequent, the satisfactions and gratifications of practicing medicine would suffer thereby. Most of us, I believe, carry the heavy responsibilities of being physicians aided by the support and satisfactions we gain in seeing our patients improve and recover. The patient who does not make the grade understandably defeats us. When we sense that the patient himself, and not some incurable physical disease, is the source of defeat, we feel resentful and angry. This is true of psychiatrists and general physicians alike, I would add. To keep perspective, the group of patients up for discussion is small; the worry and concern of the physician about them is large.

This patient usually presents herself (I use the feminine gender advisedly, since in my own experience most of the patients have been women) to the doctor with a number of physical complaints, and the symptom of overwhelming fatigue is usually among them. The attitude of the patient is that of the sufferer who has borne her heavy load with great courage and fortitude; although the condition has been a part of her for years, she has the acute expectancy of finding a cure speedily at the hands of the new doctor. I speak of the new doctor because the patient will ordinarily have seen quite a number of physicians if they are available. Another feature that is evident if watched for is the large measure of hostility and anger, usually expressed indirectly and with a smile, that this patient carries.

For the first week or two, whatever the diagnostic studies done and treatment given, this patient gets somewhat better, and the doctor and patient are much encouraged. This can be called the stage of "seduction." At this point the unwary physician is getting into an intellectual tar pit, believing that he has succeeded where many have failed. Then, regardless of treatment employed, symptoms begin to return and the road begins to get rocky. What has a few days before seemed like such a happy outcome now is turning sour. The physician, if he has been therapeutically seduced, will not understand it. Things grow slowly worse. The complaints increase in area and depth, the patient is crippled, the family is upset, and so is the doctor. He cannot find anything of enough importance pathologically to account for all the symptoms.

At about this point the patient begins to show an uncanny ability to make the doctor feel as if it were all his fault somehow, and the screw is given another turn. The physician is in a particularly difficult position if he has performed an exploratory laparotomy because of the patient's abdominal complaints. Although he found nothing in the belly, lo and behold, the patient has felt fine for the first week or so post-operatively. The doctor is, of course, pleased that he has been of help even though in his own thoughts he is

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profoundly puzzled that an exploratory laparotomy with normal findings has helped the sufferer.

Then a day or two before discharge from the hospital, there begins a fleeting abdominal symptom or two. By the time the date of discharge arrives, the patient is not very well and the surgeon is worried. He knows the belly was all right when he was inside of it two weeks previously. "Are the symptoms due to something I did," thinks the surgeon. "After all, she was without any symptoms for a good ten days. Are these symptoms due to adhesions caused by the surgery?" If this thought is annoying enough and the patient and her family desperate enough, the physician may go back for another look, or more likely another doctor will. This is the patient who may have several scars on her abdomen—perhaps three or four.

One brief case history may be illustrative. Several years ago a woman in her late thirties was referred to the hospital by her family doctor. He had called the psychiatric service because he had correctly diagnosed a serious emotional problem even though his patient had only physical complaints: overwhelming fatigue, headache, abdominal cramps, and a host of minor symptoms. The understandable frustration of the doctor was carried in his recommendation that after psychiatric study he imagined we would want to send her to a state hospital. "She's been a burden to her family and everybody up here, and she would be better off in a state hospital," were his words.

What kind of monster was this woman? She was a small, wiry, immaculately dressed woman who weighed 97 pounds. When she sat down in the office, although she said she was exhausted, she was the picture of health and graciousness. Her conversation went something like this: "I'm so grateful that a busy man like you is willing to take the time to see me, and I know you can help me. It's discouraging to go to doctors all the time and get nowhere. They do their best; they don't really understand how I suffer. I can tell that you understand and I feel better already. It's so nice such a busy person is willing to see me. The last time I was at 'X' clinic, it was terrible. The doctor I had spent a few minutes with me each day. How could he tell me that my heart was all right when he hardly knew me? That's the trouble with that clinic—you're just a number. I'm so exhausted and won't be able to talk much longer. I've heard such good things of the University. Isn't Doctor X, the famous surgeon, at this hospital? You're a psychiatrist, aren't you? How do you stand it all day long just listening to people complain and talking to them? You must be a very well balanced person, and if I ever really need a psychiatrist, I would certainly like to have you. It's too bad all doctors aren't like you. Most doctors are really quite ignorant and don't seem to care much how their patients feel. I imagine that's why people don't think as much of doctors as they used to."

I believe this is a reasonably accurate verbatim account of the first few minutes I spent with this patient. None of you will fail to see how hostile and attacking this woman was. When such a patient attacks doctors in general, she is of course attacking the physician in front of her. When this happens, even though the patient seems unctuous with the doctor at hand, it is not hard to visualize what she will tell the next doctor about this one.

Before leaving this patient, let me tell you of one other typical and revealing experience I had with her. I had been seeing her about three weeks. She had done quite well for the first week or ten days, then began to go downhill. On this particular occasion she pointed out that she was somewhat worse than when she came. She said, "You're very nice. You are an excellent doctor. It's too bad I'm getting sicker."

Sooner or later, although not always, the physician senses he is up against a very respectable opponent. He intuitively begins to realize that the patient is determined to hang on to every symptom; to carry on guerilla warfare; to find the weak spots and exploit them; and all in all to demoralize the doctor and his doctoring, all the time suffering and remaining extremely miserable. But patients do not play such bruising games without reason, and I shall return to this in a moment.

The result of this particular kind of Doctor's Dilemma usually ends up in one of these ways:

1. The doctor is trapped. He makes frequent house calls, particularly in the dead of night, often summoned by a frantic and panicky husband, to give some life-saving sedative so the patient can get a few hours' sleep and struggle through the morrow. The doctor in the recesses of his own mind is puzzled by the whole affair and is fearful that the patient is becoming addicted to sedatives.

2. The physician abandons the ship. He either sends the patient on a cruise which solves things for several months, or if he is lucky, he can get some other doctor to take her over. If he is in a big city, this can be a psychiatrist.

3. He takes the bull by the horns, sets definite limits, and the patient and doctor both begin to feel more comfortable. I shall also return to this in a moment.

I hope I have not conveyed the impression that a patient of this sort cannot be handled by a general physician, because it is possible. It is, however, important that the physician recognize this patient, diagnose her correctly, have some idea of why she is reacting in these ways, and have some knowledge of treating her. Before going into these matters, let me point out one important aspect of this type of situation. This has to do with the doctor in his relations with other doctors. This type of patient degrades former physicians and flatters the one in front of her. She often will tell neighbors and others that Doctor So-and-So down the block is not entirely competent, or that patients are treated badly at the Such-and-Such Clinic or at the University, et cetera. This is a fertile breeding ground for misunderstandings between doctors and emphasizes their need for good communication with each other about patients. This patient has an uncanny ability to exploit little things the doctor says or leaves unsaid. There is no doubt that an extra degree of caution is in order with respect to casual remarks, lest misunderstandings occur.

Let us return to the three aspects I mentioned before: diagnosis, the reasons behind the neurotic behavior, and treatment. Diagnosis depends on two sets of data. The first is an accurate medical history. The numerous complaints, including fatigue, the duration of illness, the number of doctors seen, and sometimes the number of major operations without real indication give pointed clues to the diagnosis. Secondly the attitudes of the patient are important: the way in which she tells her story, her tendency to run down previous doctors and to flatter the one in front of her.

The neurotic mechanisms operative behind the symptoms and behavior are several. The hostile dependent quality (both the hostility and the sticky dependency are marked) is often regarded as deriving from a strict, rigid childhood background in which the child was made fearful of displeasing anyone, but made angry by such rigid limits; however, the anger could never be openly expressed lest the child be punished further. The child learns that the best way to meet life is to be nice to everyone one meets even if one hates them; that any anger must be expressed indirectly or the fault made to lie elsewhere; that there are gratifications in seeing the strong people who punish one made to feel helpless and without power; that one must never get too close to anyone lest he get hurt by being close; that to love anyone maturely is too great a risk.

In many ways, strange as it seems, perhaps the most mature relationship this patient ever makes with anyone is with the doctor. She can pay a fee for the dependency she feels and hence has some measure of control over it. In turn, she can sense some security in feeling that a parent-like figure, the doctor, wants to help. Every relation is tested in many ways; and when the doctor gives up or becomes angry with her, her old childhood self, upon being rejected again in this way, says, "I told you so—people always treat you this way. Don't trust them." That the patient is no longer a child and the doctor is not a real parent are factors which cause this to be termed neurotic behavior.

Based on such understanding, the role of the physician becomes more clear although not necessarily less difficult. He will seek to be a kindly but firm parent who can be respected. He will protect the patient from her own hostile aggressive impulses and will not be visibly upset either by her seductive behavior or by her anger. His attitude will be one of wanting to help within the definite limits he sets, for example, seeing the patient every other week for twenty minutes but not oftener. He will be of help to her by not giving medication, particularly sedatives, simply because she asks for it and by giving her an opportunity gradually to talk about herself instead of symptoms. To be this trustful takes a long time. When such a patient at long last begins to break down by showing some feeling and by talking seriously and from the heart about personal problems, the doctor can afford a sigh of relief in the knowledge that he has helped another human being break the egg shell of emotional infancy.

Reconstruction of Major Blood Vessels Employing Artery Homografts

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THE need for suitable blood vessel grafts has existed for many years but only recently have technical advances been such that it has been possible to employ grafts on a widespread clinical scale. For such advances we are indebted to Carrell,[1,2] Gross,[3] Hufnagel,[4] DeBakey,[5,6] Blakemore[7] and many others.[8,9,10,11] The major efforts in vessel replacement have been in the use of vein or artery homografts, but because of the difficulty of obtaining suitable donor material increasing interest has been shown in the use of various plastic substitutes for blood vessels.

The need for grafts is seen most frequently in arteriosclerosis for the replacement of segments of large vessels involved by aneurysms or thrombotic occlusion. Some congenital anomalies such as aortic coarctation demand the use of vessel grafts for suitable correction of the defect. Trauma and tumors involving large vessels play a small but significant role in the need for blood vessel grafts. The success of the graft is directly proportional to the diameter of the vessel replaced, for in smaller grafts the incidence of thrombosis is increased.

Early attempts to graft blood vessels were made using vessels taken at autopsy under sterile conditions and preserved for a short time by refrigeration. This method proved to be cumbersome and unreliable for the specimen could be kept for only three or four weeks before degeneration progressed to a point where the grafts became soft and weak. Rupture of overage grafts has been reported.[12] Freezing of grafts with such agents as carbon dioxide or liquid nitrogen allowed for prolonged preservation. These grafts were found to function about as well as the fresh grafts. However, storage at the low temperature requires costly equipment and constant attention to the maintenance of freezing temperatures. Lyophilization of the grafts made it possible to keep the specimen at room temperature for an indefinite period of time. Subsequently sterilizing solutions such as ethylene oxide and beta propiolactone obviated the need for taking the grafts under sterile conditions for these substances will effectively sterilize blood vessel grafts without changing their characteristics.

The need for grafts has surpassed the supply; therefore, many investigators are studying various plastic materials in an attempt to find substances from which to fashion satisfactory prostheses for blood vessel replacement. This search for vessel substitutes is not new for attempts have been made in the past to use tubes of glass, aluminum, silver lined with paraffin and gold plate. These were uniformly unsuccessful. In the past two years extensive study of new plastic materials has revealed that numerous materials can apparently be used. Blakemore[13] and Voorhees have worked with vinyon-N. Hufnagel[14] and others have worked with orlon. Schumacher[15] tried nylon while others have used fiberglas, dacron and many varieties of these cloths. Lewis[16] has been experimenting with tubes fashioned from Ivalon sponge. These tubes are easily made and can be handled much more readily than the other prosthetic materials. The material sews very much like the adjacent vessel and holds the sutures well. Early studies indicate that it is satisfactory material for vessel substitution.

The grafts which we are to present here are all homografts but the mode of preparation and preservation differs in each case. We have chosen three patients to illustrate the value of blood vessel grafts emphasizing the importance of the assistance of other doctors in obtaining suitable blood vessels at autopsy.

The first patient is N.K., a forty-eight-year-old bartender who was seen in May, 1954, complaining of cramping pains in the calves of the legs for three months. His feet constantly felt cold and with the slightest exertion he had pain in the lower back, hips

and thighs. Impotence had been progressive for several months. Examination revealed absent pulses in both lower extremities and only faint aortic pulsation in the abdomen. May 12, 1954, aortography (Fig. 1, *left)* revealed severe occlusive disease of the distal aorta. On May 24, 1954, a right lumbar sympathectomy was carried out because of increasing pain in the right thigh and because no suitable graft was available. Resection of the distal aorta and proximal iliac arteries was effected on June 18, 1954. The right hypogastric artery was ligated because it was severely diseased and an aortic Y graft was inserted for reconstruction of the defect as shown in (Fig. 1, *right).* The patient was discharged from the hospital, June 26, 1954, with good dorsal pedal, posterior tibial, popliteal and femoral pulses bilaterally. The patient walked without pain at discharge and is engaged in a full time job which he conducts

Fig. 2a. Aortagram in Case 2.

without difficulty. When seen on November 4, 1955, examination revealed that there was no longer a pulse in the right leg. Oscillometry at the left calf was 2.5, at the right calf it was 0. The patient has had pain in the right leg with walking for about one month. The examination indicates an extension of his thrombotic process. Whether this began primarily in the graft or in already diseased vessels is difficult to say, but the probability is that the process began in diseased vessels distal to the graft.

The second case is that of I. D., a fifty-two-year-old railroad cook, who was seen first in November, 1953, complaining of inability to walk more than half a block before getting severe cramps in the right leg. His symptoms were of four years' duration. He also had night cramps in both legs, low back pain and pain

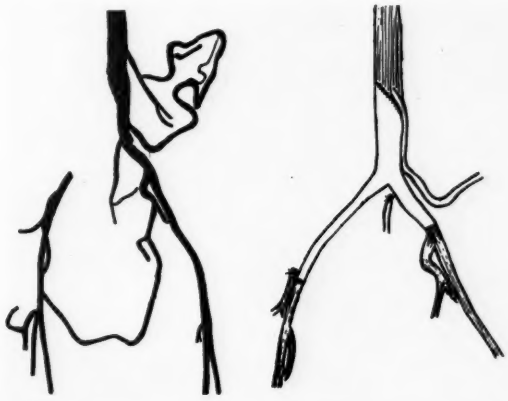

Fig. 1. *(left)* Reproduction of aortagram in Case 1. *(right)* Extent of graft replacement in Case 1.

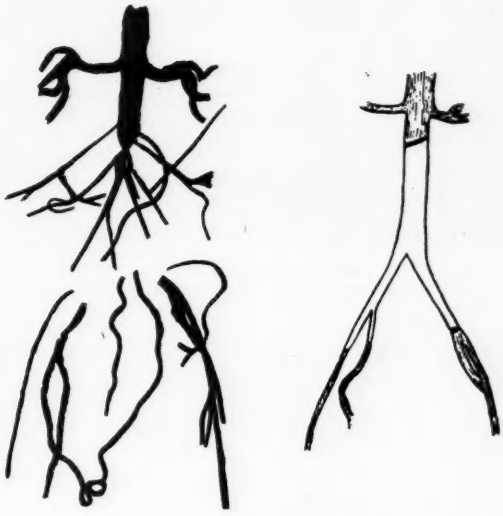

Fig. 2b. *(left)* Schematic reproduction of aortagram, Case 2. *(right)* Graft replacement in Case 2.

in the hips with exertion. Impotence had been progressive over the previous four years. The feet were constantly cold. Examination revealed absent femoral, dorsal pedal and posterior tibial pulses bilaterally. Dependent rubor was three plus.

Right lumbar sympathectomy was carried out November 5, 1954, without significant improvement. Aortography revealed complete occlusion of the distal aorta with patent distal vessels (Fig. 2a and 2b *(left).* January 3, 1955, the aorta was replaced by a Y graft, (Fig. 2b, *right).* Postoperatively the femoral, posterior tibial and dorsal pedal pulses were excellent. The legs

were warm and the color was good. The patient was discharged from the hospital on February 10, 1955. At present the patient states that he can walk five miles without having his legs tire. He also states that his impotence is improved. Oscillometry before operation was without response while at present the readings at the calf are 3.5 points. The patient has resumed work as a railroad cook which duty requires his working fourteen to sixteen hours a day standing on a moving train.

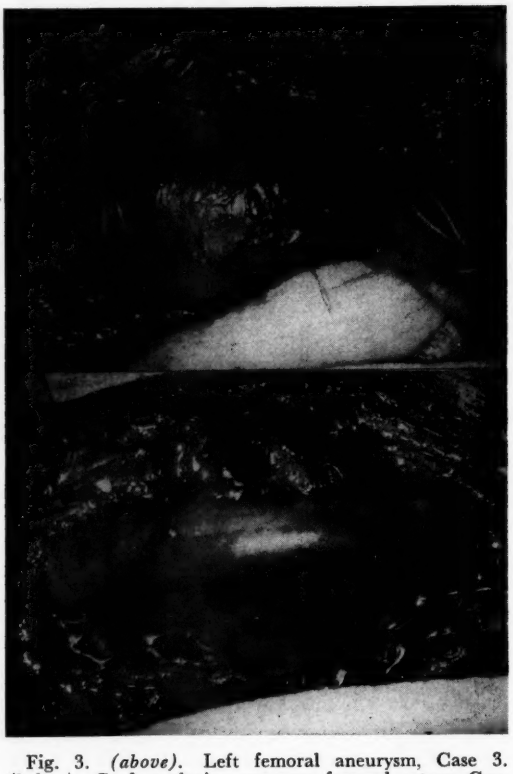

Fig. 3. *(above).* Left femoral aneurysm, Case 3. *(below).* Graft replacing common femoral artery, Case 3.

The third patient, B. A., a sixty-four-year-old salesman, was seen March 19, 1955, complaining of sudden numbness, coldness, paleness of the right leg with severe pain in the extremity. For three years he had noted increasingly severe intermittent claudication of both legs. Examination revealed absent popliteal, posterior tibial and dorsal pedal pulses on the right. The left popliteal pulse was present but posterior tibial and dorsal pedal pulses were absent on the left. Diagnosis of the thrombosis of the right superficial femoral artery was made and exploration of the vessel was carried out with the intention of doing an endarterectomy. Three aneurysms in a severely diseased artery were found and no repair could be effected; therefore, right lumbar sympathectomy was performed and the response was excellent. On May 3, 1955, the patient was again admitted to the hospital because of a large, painful mass in the left groin, and resection of a large aneurysm of the left common femoral artery was carried out on May 5, 1955 (Fig. 3, *above).* The defect was replaced by a Y graft connecting the external iliac artery to the superficial femoral and to the deep femoral arteries (Fig. 3, *below).* The response was excellent and the patient was relieved of pain in the left leg as well as the groin. He was again admitted to the hospital on August 11, 1955, because of an enlarging mass in the right groin and severe pain in the right groin and thigh. Resection of a large aneurysm of the right common femoral artery was carried out. A straight graft was placed between the external iliac and deep femoral arteries. The superficial femoral artery was ligated because it was completely occluded by old thrombus. The patient was discharged markedly improved but is forced to limit his activity because of pain in the right leg after walking two blocks.

These three patients illustrate the use of grafts preserved by various methods. The first graft was taken with sterile precautions and was refrigerated in sterile saline solution until it was used ten days later. The second graft was taken without aseptic precautions, was sterilized with beta-propiolactone and was refrigerated in Gross-Hanks solution. The fourth and fifth grafts were taken at routine autopsy, were sterilized with beta-propiolactone, frozen, dried and stored at room temperature. These grafts were reconstituted in saline and inserted after suitable tailoring. To date these grafts are functioning satisfactorily. No postoperative arteriograms have been made, but examination of pulses and check of oscillometry reveals that the grafts are patent. Furthermore the improved functional capacity of the limbs in each case is so striking that there can be little question as to the function of the graft.

At the present time, our grafts are taken at autopsy without sterile precautions. They are examined to make sure that the vessel is free from atherosclerotic changes, the adventitia is removed from the vessel, which is then immersed in about a liter of normal saline solution. One per cent (by weight) of beta-propriolactone is added, and to this enough phenol-red to color the solution. Sodium bicarbonate is added to bring the pH to between seven and eight, as indicated by a red color of the phenol-red indicator. The blood vessel is then incubated for two hours at 37° C. in this solution. Sodium bicarbonate is added as necessary to maintain the proper pH during this period. Finally the aorta is washed in saline and cultured both aerobically and anaerobically.

At this point, the vessel is prepared for short

term storage or for long term storage as is deemed necessary. For short term storage (four to six weeks) the vessel is suspended in a plasma fortified polyionic solution (Gross-Hanks) to which one gram of neomycin and one million units of penicillin have been added. The vessel is stored at 20° F. in a sterile container and may be used without further preparation. For long term storage the vessel is blotted of excess water on sterile towels, placed in a sterile 3x30 cm. test tube and immersed for five minutes in a solid carbon dioxide methyl cellosolve mixture at —70° C. The tube with the frozen vessel is attached to a lyophilizing apparatus and subjected to a vacuum of thirty-five microns of mercury for forty-eight to seventy-two hours. The tube is then filled with dried nitrogen and removed from the apparatus, capped with a special rubber sleeve stopper, sealed with glyptal and re-evacuated by means of a needle through the sleeve stopper. The vessel may be kept indefinitely at room temperature. This method has been adapted from the technique of Szilagyi.[17]

It is becoming ever more apparent that plastic substitutes will take the place of homografts and autografts. The ideal plastic has not yet been demonstrated but it should be (1) readily available, (2) easily constructed in various sizes and shapes, (3) adaptable to operating room sterilization, (4) easily sutured to the adjacent vessel, (5) impervious to blood, (6) "non-wettable" by the blood, and (7) capable of curving rather than kinking, with flexion of joints. As judged by early studies, the plastic substitutes are not as satisfactory as arterial homografts, but there may be some long term advantages. Late degenerative changes, late calcification and late aneurysmal dilatation have been noted in homografts. These changes probably do not occur in the plastic prosthesis although there has not been sufficient long term study to give a satisfactory answer to this question.

Summary

1. Homografts preserved by various means play a prominent part in the treatment of arterial disease.

2. Prosthetic grafts promise to take the place of arterial homografts.

3. Three cases, in which four arterial homografts were used, show the benefits obtained with grafts.

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The Changing Character of Infections as the Result of the Era of Chemotherapy

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PHYSICIANS who practiced in or before the 1930's and are in practice now would readily admit to a change in the character of the common infectious diseases that has taken place during the past twenty-five years. In fact, medical students of today marvel at the change which has taken place since 1940, particularly after reading Geddes Smith's book entitled "Plague on Us" published in 1941.[1] They immediately sense the fact that little is stated concerning sulfonamides and nothing about antibiotics. They infer that changes since 1940 came about entirely or largely because of the so-called "wonder drugs."

Since the beginning of the century there has been a change in the incidence and severity of infectious diseases, and deaths resulting from most of them have decreased in a remarkable manner. On the other hand, heretofore less well known infections such as the rickettsial diseases—Rocky Mountain spotted fever, Q fever and rickettsialpox —have warranted greater attention. The infectious encephalitides have also come to the fore—more specifically, eastern and western encephalomyelitis occurring in the United States and Canada. Upper respiratory infections of a viral nature, other than the common cold and influenza, have recently been discovered. Another example is the appearance of Coxsackie disease, which may give rise to a poliomyelitis-like infection, is responsible for epidemic pleurodynia (Bjornholm's disease) and herpangina.

A cursory look at the reduction in death rates and the lowered incidence or milder form of ordinary childhood diseases now present compared with experience just two decades ago, might lead one to ascribe these changes in their entirety to the advent of sulfonamide and antibiotic therapy. In order to orient oneself with relationship to factors that may have played a part in the changing character of infections, a look at the record is necessary and revealing. In Table I, death rates are given for certain diseases by the time intervals 1900, 1925, and 1950. The data comprise death rates for certain diseases in the U. S. registration area based on deaths per 100,000 of the population. Case rates might have been chosen but would not serve as well as death rates, for there is less chance of quibbling in relation to a death resulting from a specific disease than when consideration is given to inclusion of a case in the same category. The three time intervals chosen for comparison are rather ideal, for the year 1900 saw a beginning decline in cases and deaths from most of the common infectious diseases and the period between 1900 and 1925 can be stated as that period during which environmental sanitation exerted a marked influence on the occurrence of gastrointestinal infections and, as often happens, a reduction in such infections lead to a diminution in other nonenteric infections.

TABLE I. DEATH RATES FOR CERTAIN DISEASES

U. S. Registration Area (Deaths per 100,000 Population)

Disease	1900	1925	1950
Diphtheria	40.3	7.8	0.3
Malaria	6.2	2.0	0.1
Measles	13.3	2.3	0.3
Pneumonia and influenza	202.2	121.7	27.0
Scarlet fever	9.6	2.7	0.2
Tuberculosis	194.4	84.8	22.6
Typhoid fever	31.3	7.8	0.1
Whooping cough	12.2	6.7	0.7

The interval between the year 1925 and 1950 may be termed the era of chemotherapeutic and antibiotic therapy. The table discloses that between the period 1900 and 1925 no rate increases are noted for the diseases listed. Actually, all infections show marked declines, with 1900 rates two to five times greater than those recorded for 1925. Thus, before sulfonamides and antibiotics were available, marked changes had occurred in the number of deaths recorded for the diseases indicated in the table. This phenomenon took place

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during the so-called era of environmental sanitation and of the diseases noted only typhoid fever and malaria would strictly come under this category. Yet upper respiratory infections, such as diphtheria, measles, pneumonia, scarlet fever, tuberculosis and whooping cough, all showed a favorable downward trend in death rates.

During the period 1925 and 1950 sulfonamides and antibiotics were widely used. A comparison of the 1925 death rates with those in 1950 indicates a reduction in the latter year of the magnitude of two to twenty-five times. However, some of the diseases listed in the table are not *per se* amenable to drug therapy. Diphtheria is one such, and the reduction here must be attributed to the use of toxoid for active protection against the disease, among other factors. The decline in malaria can be attributed to the use of antimalarial drugs not included in the sulfonamide or antibiotic group and to institution of antimosquito measures, particularly to the use of agents such as DDT. Measles is an example of death reduction resulting from the control of secondary bacterial invaders which are amenable in part to drug therapy. The remainder of the diseases in the table have been influenced by the use of antibiotic agents but deaths from these infections had also markedly declined in the period 1900-1925.

There is no intention of slighting the value of drug therapy, but one must consider the past in order properly to measure the present. As stated before, environmental sanitation played a large role in the decline in deaths noted between 1900 and 1925. In addition, a consciousness of the importance of personal hygiene became evident around 1910 while rapid strides were being made toward an improved community hygiene. With relation to the period 1925 to 1950, personal and community hygiene continued to exert a marked influence and in addition, an improved economy, a better nutritional state and adequate housing were added factors along with chemotherapeutic and antibiotic agents in causing a reduction in mortality rates.

Before proceeding further with the discussion of the changing character of infections, it might be well to define the term infection. Infection is the interaction between a host and a parasite in an environment common to both, and this can be written as an equation namely, infection = host + parasite + environment. All three of the mentioned components are necessary to the production of infection. Absence of one makes it impossible for infection to occur. None of the three components is *most* important in the equation, but there is an indication that for a particular set of circumstances one may be *more* important than the other.

Changing infections are the result of natural host-parasite relationships in which there is an absence of interference by man resulting in a normal rise and fall in disease incidence and secondly, by a non-natural, host-parasite relationship in which there is human host interference in an attempt to eliminate the parasite or its transmitters (vectors). There are certain factors affecting each of the components of infection. With relation to the *host* the following factors are of importance: personal hygiene, the economic status of the individual, the possibility of improved nutrition because of the better economic state, increased natural resistance and agents for prevention and treatment of disease. *Parasite* factors are contingent upon the virulence of the organism, on the quality and number of the reservoirs harboring the parasite and on vectors, which make transfer of the organism from host to host possible. *Environmental* factors are bound up with community hygiene, particularly with relation to the purity of water and foods and with facilities for disposal of sewage and wastes. Housing is another important factor in this category. With relation to all three components the factors cited are perhaps the more important, but there are others that have not been mentioned.

Having set the stage, so to speak, by showing multiple causation for changes in death rates that have occurred since 1900, let us consider the effect that chemotherapeutic agents and antibiotics have had on the changing character of infections. The evidence for an effect appears obvious for diseases in which the causative organisms are sensitive to antibiotics. For example, there has been a lowered incidence of syphilis and a decline in death rates attributable to tuberculosis. However, a change in character has been noted also in infections for which the causative organisms have been more or less resistant to antibiotics. Changes have been due to recalcitrant infections such as *S. aureus,* certain Gram-negative bacilli and tuberculosis. Secondly, changes have been due to superinfection, which is the result of replacement of antibiotic sensitive bacterial flora by a different species of organism resistant to the antibiotic

being used. Monilia, proteus, and pyocyaneus infections and staphylococcal enteritis serve as examples.

Recalcitrant infections and superinfections are the result of resistance of organisms to antibiotics. The origin of resistance is supposed to be twofold namely, genetic, by transfer of a Mendelian characteristic or secondly, by physiologic adaptation, the drug inducing resistance biochemically. Information on the origin of resistance is incomplete for it is difficult to devise crucial tests or to determine cause and effect, because the drug is required to test resistant cells. The reasons for resistance are also unknown, for there have been few investigations on metabolic changes accompanying acquisition of resistance. From studies reported thus far, it is logical to assume that (1) bacteria change their enzyme systems; (2) the growth medium influences the adjustment; (3) antibiotic inactivators such as penicillinase are present in micrococcus or *S. aureus* infections, and a chloramphenicol-reducing enzyme is produced by some strains of micrococcus; and (4) antibiotics may be stimulators of bacterial growth as shown by Garrod.[2] The Arndt-Schulz law which states that weak stimuli increase physiologic activity and very strong stimuli inhibit or abolish activity may apply to antimicrobial drugs: for example, a penicillin concentration of 0.004 units per ml. is a stimulant for *S. aureus,* while a penicillin concentration of 4 units per ml. enhances the growth of *Pseudomonas aeruginosa.*[3]

From the therapeutic standpoint, resistance to antibiotics is probably the result of the operation of one or more of the following factors: first, unwise choice of an antibiotic—the organism not being sensitive; second, the misuse of an antibiotic, by long continuance of a slightly effective drug; third, by prolonged uninterrupted prophylaxis, which is generally futile, an economic waste and often detrimental; and finally by use of combinations which may antagonize. The antibiotics may be divided roughly into those which are bactericidal and those which are bacteriostatic. In the bactericidal group are penicillin, streptomycin, bacitracin, and neomycin, while in the bacteriostatic group are chlortetracycline, chloramphenicol, oxytetracycline and tetracycline. The use of one or more drugs in the bactericidal group with a drug in the bacteriostatic group may result in antagonism rather than synergism.

Infection as a Biologic Phenomenon

A more important and more fundamental reason for a change in the character of infections may be that infection is a biologic phenomenon. A proper perspective demands consideration of the term ecology. Ecology is the relationship between various living organisms in an environment and of their reactions to their animate and inanimate surroundings. Human ecology is the study of the whole of man's habits and modes of life and his relations with his surroundings. Ecology denotes the close relationship between all living things and in considering the definition for infection we find that the host-parasite relationship is an ecologic phenomenon. Now, the host-parasite relationship may result in inapparent or subclinical infection, apparent or clinically recognizable infection (disease) and death. As medically trained individuals we have looked upon the disease and death components of infection as particularly undesirable. Actually, the host-parasite relationship results in disease and death only occasionally and the factor of inapparent infection is by and large more important, for in this situation the adjustment of host and parasite has not been inimical, but valuable; nearly always inapparent infection results in protection of the human host against severe disease or death.

In thinking of certain wild animals, predation is called to mind, a preying of one animal upon another. This can hardly be stated of the host-parasite relationship; however, it is an example of parasitism and we can readily substitute the word parasitism for the word infection in the equation infection = host + parasite + environment. Looking upon parasitism or infection from the standpoint of the parasite, it must be immediately obvious that survival of the parasite is dependent upon the well-being of the host. If the host is critically ill, it will be to the detriment of the parasite and if the host dies the parasite will likely die. Thus, in terms of the parasite, disease and death are evidences of a bungling parasitism. The relationship which is optimal to both host and parasite is commensalism—a mutual but almost inconsequential association between a parasite and its host.

In 1869, Van Beneden[4] wrote a book entitled "Animal Parasites and Messmates" and Vaughan[5] over thirty years ago used the word syssitic (to eat together) to describe the host-parasite relationship. Smith[6] elaborated on this concept in

1934 in his book entitled "Parasitism and Disease." A messmate is a person with whom one sits down to eat, and Van Beneden looked upon the host-parasite relationship as such an association. As good an example as any is the relationship between the colon bacillus and man, the former being present in the gastrointestinal tract of man shortly after birth and remaining with him until death. The colon bacillus rarely causes disease in man, but generally influences the environment in the gastrointestinal tract to such an extent that by sheer numbers it displaces most of the organisms that might be pathogenic. The bacillus also aids in the synthesis of vitamins. Commensalism is the host-parasite relationship which is constantly striven for in nature.

Now, prophylaxis and treatment accorded the human host is interference with normal host-parasite relationships and leads to change in the character of infections. Martí-Ibañez[7] states, "Because antibiotics intervene at the most subtle phases of metabolism and in the most delicate enzymatic actions of bacterial life, they provoke changes in the bacteria's biological cycle which have already been translated into radical changes in the diseases they cause." Nature tends to preserve species and, in the biologic sense, organisms as species may be as important as human beings. The use of antigens and prophylactic or therapeutic agents destroys or makes difficult the host-parasite relationship, and from the standpoint of the parasite is a danger to its preservation. The parasite, like the host, has weapons or dodges which aid in self-preservation and these it utilizes, and one dodge is drug resistance. Administration of antibiotics disturbs the ordinary bacterial ecology of the body and disrupts the delicate balance between organisms. The inhabitants of mouth, throat, upper respiratory tract, intestinal canal, vagina and skin that are resistant to one antibiotic may multiply when that antibiotic is used to suppress an infection.[3]

Solution to the Changing Character of Infections

In the light of consideration of infection as a biologic phenomenon should we interfere in the host-parasite relationship? In situations where the association is not inimical to man there is no reason to disturb or change it; however, it is obvious that the ideal host-parasite relationship is not operative for all infections affecting man and rickettsial diseases serve as an example. Use of some wide-spectrum drugs for rickettsial infections or for typhoid fever may cause temporary elimination of the relatively harmless *E. coli* in the gastrointestinal tract and may result in superinfection, a penalty that may have to be paid when such antibiotics are used to overcome infections where the balance is often heavily weighted against man. However, the possibility of superinfection demands careful consideration of antibiotic prophylaxis and treatment.

Chemotherapeutic and antibiotic agents should be used wisely. This can be accomplished, first, by determining the agent causing the infection and secondly, by combating resistance and superinfection. Too often treatment is begun before the organism causing the infection has been isolated from blood, spinal fluid or a lesion. There is an urgency to get the patient under treatment. The following quotation[8] states the problem, "The use of antibiotics has forced the physician to face a series of antinomies encountered in his daily practice. Among these contradictions is the . . . obligation to distinguish between the need for a diagnosis and the imperative duty to apply treatment: *to know* and *to cure*, the cognitive and the operative actions." Having found the causative agent use the antibiotic indicated, which can be done without sensitivity tests except when dealing with an organism the strains of which have been shown to exhibit wide variation in susceptibility to the antibiotics under consideration.

Several means are available to combat resistance and superinfections. New antibiotics may be introduced; fortunately, this has occurred frequently enough since the discovery of sulfonamides so that a choice in prophylaxis or treatment has been available. With ample choice of drugs, resistance is less likely to be a serious hindrance to treatment. A few simple rules for chemotherapy should be observed:

1. Avoid indiscriminate use of antibiotics when of no real value, as exemplified in the following viral infections: the common cold, respiratory infections (of presumed viral origin), primary atypical pneumonia, viral hepatitis, and the common viral infections such as chickenpox, measles, rubella, and mumps. The advantage of using antibiotics in viral infections results from the suppression of secondary invaders, but there are disadvantages. Actually, the use of the drugs favors organism resistance, host sensitization and untoward reactions and the occurrence of intractable

infections such as moniliasis, staphylococcal enteritis, and others.

2. Give the correct dose of the proper antibiotic only as long as necessary attempting to end the infection rapidly.

3. Use combinations of antibiotics and/or sulfonamides only when a single antibiotic will not do.

4. Where long term treatment is necessary, as in tuberculosis, skillful alternation of combinations becomes necessary.

5. Where topical application is as suitable as systemic, use neomycin or bacitracin for skin and conjunctival infections.

6. Use a sulfonamide when indicated. It may be the drug of choice, as in meningococcus infections; it may overcome the shortcomings of antibiotics; or, combined with antibiotics, they may be synergistic in action, result in potentiation, and prevent superinfection.

7. Substitute isolation for prophylaxis to prevent cross-infection in hospitals as the result of contact with healthy carriers among hospital personnel. This can be accomplished by putting patients in cubicles or single rooms, by using aseptic technique and by restricting the number of staff members attending and caring for the patient. This may appear to be a retrograde procedure, for isolation and quarantine procedures have been minimized considerably over the past several decades; yet when one encounters hospital infections, particularly staphylococcal, like those cited by Dowling, Lepper and Jackson [9a,b] and Spink[10] among others, it is necessary to assess critically the situation and determine whether or not isolation might not be a better means of holding in check such cross-infections than the continual prophylactic use of sulfonamides or antibiotics.

Summary

In this paper an attempt has been made to present a number of facets of the problem of changing infections. Many factors are responsible for the changes noted in any given period of time. Change is a common biologic phenomenon. Combating infection, when necessary and under varying circumstances, is not simple. Use of antibiotics results in interference with the host-parasite relationship and may result in desirable and undesirable changes from the standpoint of the host and of the parasite. Undesirable host changes can be minimized by proper use of antimicrobial and chemotherapeutic agents.

Anderson[11] has considered the problem of the changing character of infections from the biologic standpoint and has suggested the proper attitude toward treatment of infections. He aptly states, "The parasites will tend, in time, to find a method of circumventing our form of interference. The newest antibiotics place in our hands the means of making profound changes in the microbiology of man. Let us see that we use them with thoughtfulness."

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Congenital Obstruction of the Small Intestine and Colon

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CONGENITAL obstruction of the small intestine and colon occurs much more frequently than has been generally realized. Considering atresia alone, the incidence, according to Webb and Wangensteen,[15] in 1931 was about 1 in 20,000 births. However, some twenty years later Evans,[4] after an extensive review of the world's literature, estimated the incidence to be about 1 in 1,500 births, and further calculated that this condition resulted in the death of about 3,000 babies annually in the United States and of more than 50,000 in the rest of the world. Wilson, Nelson, and Harshbarger[18] have estimated that the average operative mortality is about 80 per cent, and therefore believe the number of children that are lost each year in the United States is about 2.200. They further state that this latter figure is approximately the same as the number of deaths (through fifty-five years of age) from appendicitis in the United States in 1949 and also equals the deaths from rheumatic fever in all ages. The significance of the above statement is obvious and emphasizes the need for improvement in the management and mortality of these infants.

There are additional causes of obstruction besides atresia. The others which will be considered in this report are volvulus of the mid-gut with malrotation of the colon, meconium ileus, and one extremely interesting case of congenital intussusception.

Complete Atresia or Incomplete Atresia (Stenosis) of the Small Intestine and Colon

Because of its common etiological origin, this group of cases will be considered together. However, the various locations of the lesions will be found in Table I. The embryological failure of vacuolation and resulting re-establishment of intestinal lumen determines the site and whether the persistent defect will be complete or partial. This theory has been accepted by most authors with the possible exception of Evans.[4]

The most common site in this small series was the duodenum. However, Gross,[7] who undoubtedly has had the largest experience in this country with these infants, observed a slightly higher incidence in the ileum. The jejunum, colon, and multiple areas of involvement are less common.

Clinical findings in these infants are quite typical and have been well described. Vomiting almost invariably occurs within the first day of life, and progressive distention will develop, depending upon the site of the obstructing lesion. With low obstructions, the vomitus will be fecal in odor and tremendous distention may develop.

A flat plate of the abdomen taken within the first day or two is ordinarily sufficient to establish the diagnosis. The differential diagnosis is of somewhat academic importance, as, with the possible exception of meconium ileus, once the diagnosis of obstruction has been made exploration is advisable and the site is relatively unimportant. Farber's[5] test of the meconium may prove to be a useful but not essential aid in determining the completeness of the obstruction. We agree with most authors[3,13] that barium by mouth is not only unnecessary but may be actually harmful because of future difficulties with aspiration, inspissation, and evacuation.

Treatment.—The importance of the preoperative care of these children cannot be overemphasized. The actual operative procedure is only a small but obviously highly important step in the successful management of these infants. Preoperative and postoperative gastric suction, careful and judicious administration of parenteral fluids, transfusions, vitamins and antibiotics are all essential and do not need further emphasis. The improvement in anesthesia in the past few years has undoubtedly aided materially in the reduction of mortality and morbidity in these infants, and we

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TABLE I. LOCATION AND DISTRIBUTION OF LESIONS IN SMALL BOWEL AND COLON

Location	No.	Living	Dead
Atresia duodenum	7	5	2
Stenosis duodenum	5	3	2
Atresia jejunum	2	1	1
Absence ileum and cecum	1	0	1
Stenosis colon	1	1	0
Total	16	10(62%)	6

have been extremely fortunate in the past few years of having the services of skilled anesthesiologists.

We customarily employ a long muscle splitting rectus incision and believe that careful but complete evisceration of the intestinal tract is necessary for accurate diagnosis. The technical maneuvers necessary to perform an anastomosis in these infants are well known to members of this audience. Our preference is for a one row, open side-to-side anastomosis, using non-absorbable suture for the duodenal lesions. In the jejunal and lower small bowel obstructions an end-to-end anastomosis is customarily employed. We have also observed that the lower obstruction cases have a longer convalescence and period of adjustment and may exhibit partial chronic distention for many months.

A brief case history of each patient follows:

R. K., white male infant, was born April 29, 1945, with a birth weight of about 7 pounds. This child started vomiting within the first twenty-four hours of life but passed several small meconium stools. On May 2, a small swallow of barium was given by mouth, which showed complete atresia in the first portion of the duodenum. There had been no bile noted in the vomitus, but there was bile in the meconium. On May 3 exploratory laparotomy was carried out, at which time a complete atresia was noted at the junction of the first and second portions of the duodenum. In addition the colon was not completely rotated, and the mesentery was rather loosely attached. A duodenojejunostomy was carried out, and the child made an uneventful convalescence and was dismissed from the hospital on June 8, 1945. The child was last seen on July 18, 1947, at which time a normally functioning anastomosis was observed between the duodenum and small bowel, with normal emptying of the stomach. The child was developing normally in all respects.

L. T., white female infant, was born January 22, 1946, with a birth weight of 6 pounds 4 ounces. This child also showed persistent vomiting of all her feedings within the first forty-eight hours, and x-ray examination was done on January 25, at which time a small amount of barium was given, and revealed complete obstruction of the second portion of the duodenum. The child was explored on the same day, at which time it was noted there was a complete atresia of the duodenum with jejunum being extremely small, with a diameter of about 4 millimeters. A duodenojejunostomy was carried out, following which the child made a very satisfactory recovery and was dismissed from the hospital on February 24, 1946. She was last seen on December 15, 1947, at which time a gastrointestinal x-ray was made which showed an entero-anastomosis in the duodenum which functioned satisfactorily.

J. D. S. was born January 28, 1948, at another hospital. The child was premature and the birth weight was 3 pounds 9 ounces. The child started vomiting within the first few hours, although it was observed that the child had several small meconium stools. The child was carried on intravenous and subcutaneous fluids but failed to gain weight and was transferred to the Children's Hospital on February 3, 1948, at which time the child's weight was 2 pounds 14 ounces. The diagnosis of prematurity and high intestinal obstruction was made, and the child was prepared with transfusions, plasma, and intravenous feedings. On February 4 exploration was carried out, at which time a complete atresia of the first portion of the duodenum was observed. The small bowel was found to contain bile, and a duodenojejunostomy was carried out. The child did fairly satisfactorily for the first three postoperative days, but expired rather suddenly on the fourth postoperative day. Postmortem examination was done, and the essential findings were congenital atresia, complete, of the duodenum, duodenojejunostomy, hemorrhage at the anastomosis, hemoperitoneum, hypertrophy and dilatation of the esophagus, stomach, and duodenum, and prematurity.

J. S., white female infant, was born February 2, 1948, with a birth weight of 6 pounds 4 ounces. This child was born after a normal delivery but shortly after birth, when fed, vomited bile-stained fluid. X-ray examination was done, which showed a huge dilated stomach and duodenum, and a diagnosis of congenital atresia of the duodenum was made. The child was transferred to the Children's Hospital, and on February 6, 1948, exploratory laparotomy was carried out. A complete atresia of the third portion of the duodenum was observed, with bile being aspirated from the stomach. A retrocolic duodenojejunostomy was carried out, following which the child made a satisfactory convalescence and was dismissed from the hospital on March 14, 1948. She was last seen on April 15, 1948, at which time she had had no vomiting and was gaining satisfactorily.

L. G., white female infant, was born September 6, 1949. The child's birth weight was 5 pounds 15 ounces, and it had appeared normal for the first two days of life. However, the child then started to vomit and subsequently several coffee-ground emeses were observed. The child was admitted to the hospital on September 8, 1949. Physical examination revealed a well developed, well nourished, slightly jaundiced newborn female. X-ray examination of the upper gastro-intestinal tract revealed complete obstruction of the duodenum just distal to the duodenal bulb. On September 9 the child was taken to surgery, at which time a complete atresia

of the duodenum was noted above the ampulla. The stomach and first portion of the duodenum were found to be markedly distended. An anastomosis was then done between the first portion of the jejunum and the stomach. The child seemed to do fairly well following surgery but expired on the first postoperative day. The essential autopsy findings showed complete atresia of the duodenum, with hypertrophy of the proximal portion, recent anastomosis which was intact, and acute aspiration pneumonia.

L. A., white female infant, was born March 12, 1952. Vomiting which contained bile-stained material was observed in this child within the first forty-eight hours. On March 16, 1952, a flat plate of the abdomen showed the first and second parts of the duodenum and the stomach markedly dilated and filled with gas. A small mixture of lipiodol in mineral oil was injected, which showed a complete stricture at the junction of the second and third parts of the duodenum. Exploration was carried out on March 16, at which time an atresia was noted in the duodenum in the region of the superior mesenteric vessels. A retrocolic duodenojejunostomy was carried out, following which the child made a satisfactory convalescence and was discharged from the hospital in good condition. However, the child was again admitted to the hospital on May 9, 1952, with a history of recurrent vomiting for the past forty-eight hours, and had had no stools in the past twenty-four hours. Flat plate of the abomen was made, which showed many loops of distended small bowel with no evidence of air in the colon. Nasal suction was instituted, and repeat examination on May 10 and May 11 showed no improvement in the degree of distention in the abdomen, and on May 11 the child was re-explored. At this time it was observed that approximately 2 feet of the distal ileum had become adherent and rotated 180 degrees, forming a strangulation obstruction of this portion of the bowel. The strangulated segment was excised, and a one row open anastomosis made in the distal ileum. The child made an uneventful convalescence following this procedure and was dismissed from the hospital on May 18, 1952, weighing 9 pounds 3 ounces. The child was last seen on August 25, 1952, at which time the child was developing satisfactorily, and the parents moved to another city.

J. M., white female infant, was born January 25, 1954, with a birth weight of 4 pounds 8½ ounces. During the first day of life this child developed typical symptoms of upper intestinal obstruction, and a diagnosis of atresia of the duodenum was made. Unfortunately in addition this child exhibited typical findings of mongolism. On January 27 duodenojejunostomy was carried out, following which the child made a good convalescence but was not able to be discharged from the hospital until April 28, 1954, because of an ulceration on the buttocks which developed from an intramuscular injection. At the time of discharge the child weighed 7 pounds 3 ounces and has not been seen since.

Baby D., white male infant, was born February 14, 1949. This child had been born by cesarean section and weighed 6 pounds 8½ ounces at birth, the indication for section being incipient toxemia of pregnancy. Following delivery it was observed the child vomited all feedings and showed progressive abdominal distention. It was admitted to the Children's Hospital on February 17, 1949. Exploratory laparotomy was done on February 17, at which time a stenosis of the first portion of the duodenum was observed. A catheter was inserted into the stomach, but this could not be passed beyond the first portion of the duodenum. In addition there was a loose attachment of the mesentery with malrotation of the colon, the cecum and appendix being in the right upper quadrant. There was a narrow band extending from the cecum across the second portion of the duodenum, which was divided. An anastomosis was made between the third portion of the duodenum and the distal end of the stomach. Postoperatively the child did quite satisfactorily, and the abdomen became flat and meconium stools were passed by rectum. Lipiodol was given by mouth, which showed satisfactory progression through the small intestine, and feedings were started on the third postoperative day. However, on the sixth postoperative day the child suddenly became quite cyanotic, with an episode of extreme respiratory distress, and it was felt that the child had massive pulmonary edema or pneumonia. The child went downhill quite rapidly and expired on February 23, 1949. Postmortem examination showed atresia of the duodenum with a functioning gastroduodenostomy. In addition there was acute pulmonary edema and congestion, congenital malrotation of the colon, congenital hypoplasia of the kidney, and bilateral undescended testes.

T.G., white male infant was born November 20, 1949, birth weight 6 pounds 8 ounces. This child was a well developed, well nourished, white male infant, who began, when he was about sixteen hours old, to have emesis of copious amounts of light green mucous. On the second and third day he was started on skim milk, and he would retain these feedings for two or three hours and then regurgitate in projective fashion. A diagnosis of bowel obstruction was made, and he was taken to surgery, where a congenital stenosis of the second portion of the duodenum was observed. There was in addition, a malrotation and failure of fixation of the mesentery of the small intestine with a volvulus of the entire small bowel. This was replaced and a duodenojejunostomy performed. The initial postoperative course was quite satisfactory, and the child was gradually started on feedings which were increased. By the fourteenth postoperative day it was noted that the infant had become slightly jaundiced but was having stools. However, a few days later he vomited and had only two stools, and the following morning it was observed that the abdomen had become markedly distended with board-like rigidity, and the child had coffee-ground emesis. He was again taken to surgery on December 19, at which time a volvulus of the entire small bowel had again occurred, and it was unfortunately observed that the entire small bowel was gangrenous. The entire area was resected and an anastomosis made between the jejunum, about 10 centimeters below the previous

anastomosis, to the terminal ileum about 6 centimeters above the cecum. Postoperatively the child did surprisingly well initially but gradually lost weight, with multiple frequent stools, and all attempts to support the child gradually failed, and he expired on February 1, 1950, at the sixty-ninth hospital day. Postmortem examination showed the entire length of functioning small bowel to be about 9 to 11 centimeters. There was in addition duodenal atresia, functioning side-to-side duodenojejunostomy, functioning end-to-end jejuno-ileostomy, hypostatic pneumonia, bilateral pleural effusion, and obstructive jaundice.

L. F., white female infant, was born October 17, 1950, with a birth weight of 6 pounds. This child did fairly well for the first few days of life but then began to have recurrent vomiting and inability to retain the feedings and showed weight loss. The child was admitted to the hospital on October 28, 1950, when she was eleven days of age, and x-ray examination revealed a high-grade obstruction of the third portion of the duodenum. The child was prepared with parenteral fluids for a few days, and on November 3, 1950, exploration was carried out, at which time a congenital stenosis of the third portion of the duodenum was observed. A duodenojejunostomy was performed, following which the child made a fairly satisfactory convalescence and was dismissed from the hospital on December 19, 1950, in a satisfactory condition.

S. S., white female infant, was born following an uneventful pregnancy on December 1, 1953. This child in the first few days developed symptoms of upper intestinal obstruction with vomiting and repeated regurgitation. The diagnosis of congenital stenosis of the duodenum was made, and exploration was carried out on December 6. At this time a stenosis of the second portion of the duodenum was observed, and a duodenojejunostomy was performed. This child made a very satisfactory convalescence and was dismissed from the hospital on the ninth postoperative day and has since been followed by her local physician.

M. W., white female infant, was born October 7, 1950. This child had typical findings of atresia of the esophagus without a tracheo-esophageal fistula. X-ray examination revealed no gas in the abdomen, and a catheter could not be passed through the esophagus. On October 10 exploratory laparotomy was done, at which time it was observed that the upper portion of the esophagus was exceedingly short, and anastomosis in a primary fashion would be impossible. For that reason a gastrostomy was performed, following which the child did fairly satisfactorily. On October 18 cervical esophagostomy was performed, and the child again did fairly well until it was observed that considerable difficulty was being encountered through the gastrostomy feedings, and a lipiodol study revealed high-grade obstruction in the duodenum. Exploration was again done on October 25, at which time a stenosis of the third portion of the duodenum was observed, and a gastro-enterostomy was performed. Following this the child made a satisfactory convalescence. The child continued to do well and has since had a reconstruction of the esophagus done by a retrosternal jejunal loop, the first stage of which was done on June 25, 1952, with subsequent reimplantation of the lower portion of the jejunum on the stomach on November 26, 1952. This child was last seen on June 4, 1954, in excellent condition, eating normally and developing as a normal four-year-old child.

J. R., white male infant, was born January 5, 1947, with a birth weight of 6 pounds 4 ounces. This child very soon developed signs of intestinal obstruction and became markedly distended. X-ray examination revealed typical findings of intestinal obstruction and exploration was carried out on January 9, 1947. At the time of exploration an area of atresia was observed in the jejunum, which was about 2 inches in length. An entero-anastomosis was made about the area of atresia, but the child continued to have considerable difficulty in the convalescent period with recurrent obstruction. On the fifth day postoperatively complete wound separation was observed, and the child was again taken to the operating room on January 14, 1947. At this time the previous anastomosis was inspected, and it did not appear to be functioning, so the area of atresia was completely excised, the two ends of the jejunum inverted, and a side-to-side jejunojejunostomy carried out. Following this the child made a slow convalescence and was dismissed from the hospital on February 21, 1947. The child was seen several times following this and continued to have bouts of chronic small bowel obstruction, and on many occasions visible peristalsis could be observed through the thin abdominal wall. The child was then transferred to the University Hospital, and in June, 1948, exploration was again done and an extensive enterolysis was carried out, and the blind end of the side-to-side anastomosis was resected. Following this the child improved, and a telephone call to the patient's mother on October 1, 1954, was made, at which time she stated that the child was entirely normal and was going to school and getting on with no further difficulty.

G. S., white female infant, was born April 24, 1953. This child was one month premature and at birth weighed 3 pounds 6 ounces. On the first day it was observed that the child regurgitated the feedings, along with much greenish stained mucus. X-ray examination of the abdomen was made, which showed multiple large loops of dilated bowel, and in addition a perforation in the colon was observed on lipiodol enema. On April 27 exploration was carried out, at which time multiple areas of atresia were observed in the ileum, and an anastomosis was made between the mid-jejunum and cecum. In addition, a longitudinal tear in the rectum was sutured, which had undoubtedly been caused by previous instrumentation. The patient tolerated the surgery fairly well but did not ever completely recover and expired twenty hours postoperatively. The essential findings at autopsy were prematurity, multiple atresias of the ileum, bilateral atelectasis, recent jejunocecostomy, hypertrophy and dilatation of the jejunum.

S. R., white male infant, was born March 15, 1952. This child's mother was a diabetic but carried the child to delivery without difficulty and the birth weight was 6 pounds 5 ounces. The child was first fed on the second day, at which time he immediately regurgitated all his feeding, following which the abdomen became distended. The abdominal distention increased, and the child was taken to surgery, at which time the jejunum was found to be greatly dilated and ended in a blind pouch. There was no intervening bowel between that point and the ascending colon, and no cecum was present. The length of the jejunum was measured to be 29 centimeters. The colon was about the size of a lead pencil but appeared to be normal. An end-to-end anastomosis was made between the colon and the blind end of the small bowel, and the postoperative status appeared to be fairly satisfactory. The child was treated with continuous nasal suction, and he had several stools. However, he subsequently developed fecal emesis, and repeated x-ray examination showed no evidence of gas progressing through the colon. The distention was recurrent, but finally obstruction was apparently again complete, and on April 28, reoperation was carried out, at which time the anastomosis was found to be patent but was somewhat kinked and not functioning. The bowel was aspirated and a rectal tube was inserted from below through the anastomosis. On the second postoperative day the child developed signs of severe cardiorespiratory collapse, and he expired on April 30, 1952, on the forty-seventh day. Postmortem examination revealed congenital absence of the ileum and cecum, jejunocolostomy with partial atresia, and atelectasis of the lungs.

S. O., white female infant, was born January 4, 1945, admitted to the Chrildren's Hospital March 1, 1945. The presenting complaint was vomiting and distention, present since birth. X-rays showed enormous megacolon with narrowing and stricture of the rectum and sigmoid. On March 6, 1945, a cecostomy was performed. However, the bowel content was packed so solid that adequate decompression could not be carried out at the time of operation. The cecostomy was subsequently opened, and after some time the bowel content was evacuated. Because this fecal fistula did not entirely divert the bowel content, a left inguinal colostomy was performed on March 30, 1945. The patient was in critical condition for several months, requiring parenteral fluids most of the time. Subsequently numerous dilatations of the stenotic cecostomy were carried out. On November 23, 1948, a right colectomy by means of obstructive resection was performed, together with closure of an ileocolic fistula that apparently had developed following the first operation. The patient's general condition improved, but there seemed to be some chronic small bowel obstruction. The double-barreled ileostomy-colostomy was closed by resection and end-to-end anastomosis February 28, 1949. Because of dysfunction of the bowel due to atony of the ileum and distention of the colon, a resection of a segment of diluted ileum and colon was carried out April 10, 1950. On October 12, 1950, the left sigmoid colostomy was closed. This patient got along fairly well but had bouts of bowel obstruction intermittently. On February 11, 1952, a left colectomy was carried out, together with resection of a segment of terminal ileum. The ileum was then anastomosed to the sigmoid colon. The patient did fairly well but again became intermittently obstructed. On October 13, 1952, the remaining portion of the sigmoid was resected, together with some more of the terminal ileum. At this time a closure of a large defect in the mesentery at the site of former anastomosis was closed. And end-to-end anastomosis was performed between the ileum and the rectum. Since that time the patient has gotten along well and has had no further trouble with obstruction.

Results.—The survival rate in this small series of cases was 62 per cent. This compares favorably with other reported series[2,6,7,12,14] but still leaves room for improvement. Because of the association of other anomalies and prematurity, a substantial mortality will probably always exist. The unfortunate significant occurrence of mongolism in the cases of duodenal atresia has been mentioned by Gross[7] and one of our survivors unhappily substantiates this observation. The causes of death in this series will be noted in the case histories. It is hoped that with earlier diagnosis, improved anesthesia, and more diligent pre- and postoperative care, an increase in survival rate will occur.

Volvulus of Small Intestine and Malrotation of Colon

In these conditions also the embryological origin has been well established and to Ladd[9,10] must go a great deal of credit for his contributions in diagnosis, surgical management, and improvements in mortality rates for this developmental arrest. The majority of these cases occur within the first few days of life and may be indistinguishable clinically from the preceding group of cases of atresia.

The differential diagnosis is again of academic interest only, as surgical exploration is nearly always indicated in the early case. However, there is also a more chronic recurrent type of symptom-complex which may occur in the older age group and, as will be noted in the case histories, one of our patients was a ten-year-old boy.

In the infants a flat plate of the abdomen is again all that is usually necessary to establish the diagnosis of obstruction. In the older group with recurrent attacks, a barium enema may demonstrate the malrotation of the colon, and barium by

mouth will show the evidences of duodenal obstruction.

The treatment of these conditions has been well established and we have nothing to add. Again, complete evisceration of the intestinal tract is essential to making an accurate diagnosis and carrying out adequate therapy. The importance of careful preoperative and postoperative management again cannot be overemphasized.

D. G., white male infant, was born November 3, 1948, following a normal delivery, with a birth weight of 6 pounds 14 ounces. The day following birth it was observed that the abdomen was markedly distended and that during the first twenty-four hours the child had had only one small mucoid stool. Examination revealed the abdomen to be markedly distended with gas and no palpable masses could be felt. The impression was intestinal obstruction of a congenital origin, and on November 4, about forty-eight hours after birth, exploratory laparotomy was carried out. A loop of small intestine was found to be distended and gangrenous as a result of a volvulus, and this loop, together with the cecum and a portion of the ascending colon, were resected and an end-to-end anastomosis carried out between the small bowel and the colon. The postoperative course was satisfactory initially, although the child experienced episodes of recurrent distention. However, barium given by mouth and also by barium enema showed the anastomosis to be functioning satisfactorily. The child, however, soon contracted an infectious diarrhea, from which he never recovered in spite of all attempts at supportive therapy, and the child eventually expired on the ninety-seventh hospital day. The postmortem findings showed the length of the bowel from the pylorus to the anastomosis to be 22 inches and from the anastomosis to the anus 18 inches. The additional findings were atelectasis of the lungs, patient ductus arteriosus, peritoneal adhesions.

T. S., white male infant, was born February 13, 1949, birth weight 5 pounds 14 ounces. This child was born at another hospital but apparently shortly after birth the infant started to vomit bile-stained contents, and at about the age of two weeks an exploratory laparotomy was done. At this operation, according to the mother, there was found "an ulcer opening into the belly with milk escaping into the abdomen." No pyloric tumor was found. Since the operation the child had occasional chocolate colored emesis and stool streaked with fresh and old blood. For two weeks prior to admission the child had some signs of obstruction, and on the day of admission had vomited all of his feedings and had been having bloody emesis and stools. Examination revealed a twelve and one-half-week-old white infant, who was quite malnourished, wasted, and chronically ill in appearance. X-ray examination of the gastrointestinal tract was done by means of lipiodol injected in the stomach, and partial obstruction of the second portion of the duodenum was observed, which was thought possibly due to stricture or congenital bands. In addition there was a nonrotation of the colon, which was located in the left upper abdomen. The child was placed on continuous gastric suction and hydrated parenterally for several days. On May 18, 1949, exploration was carried out, at which time numerous adhesions were found in the region of the old incision and liver. The duodenum was found to be constricted by a peritoneal band, which was divided, extending from the malrotated colon across to the right posterior lateral wall of the abdomen. No other evidence of pathology was observed, and the abdomen was closed. Postoperatively the infant's condition remained fairly satisfactory and the abdomen was flat, although he continued to have occasional loose, black stools. On May 31, about two weeks postoperatively, this child suddenly began to gasp fitfully and expired quite suddenly. Postmortem examination revealed a large peptic ulcer of the esophagus with ulcerating esophagitis, postoperative intestinal adhesions, and inanition.

J. W., white male infant, was born March 16, 1950, with birth weight 7 pounds 12½ ounces. Shortly after birth it was observed that the child's abdomen was distended and generally edematous, and the child was spitting up meconium. He was transferred to the Childrens Hospital, at which time generalized edema was noted, and the abdomen was distended and rigid. A surgeon was called in consultation, who explored the baby, and apparently at the time of surgery the child's condition was quite unsatisfactory. The abdomen contained much bloody fluid, and the bowel appeared grayish in color. A drain was inserted, and the abdomen was closed. Following this, however, the child continued to respond quite satisfactorily, although the distention and rigidity remained. X-ray examination was made on March 21, 1950, with lipiodol injected into the stomach, at which time upper small bowel obstruction was observed. After repeated transfusions and intravenous fluids, exploration was again done on March 21, 1950. The old incision was opened and universal adhesions of the bowel to the abdominal wall was found. A necrotic segment of small bowel was observed, with a volvulus noted with a 360 degree twist at the base. An enterolysis of the entire small bowel was carried out and an end-to-end anastomosis made in the jejunum, with an interrupted single layer suture. Microscopic section of the removed specimen showed it to be ulcerating gangrenous bowel. Postoperatively the child's convalescence was gratifyingly smooth, and on March 26 x-rays showed no evidence of bowel obstruction. The child was dismissed from the hospital on April 26, 1950, weighing 6 pounds 4½ ounces. He was last seen on October 22, 1951, with a slight discharge from the umbilicus, which was cauterized, but in other respects the child was normal and developing satisfactorily.

N. T., white female infant, was born November 15, 1950, with a birth weight of 4 pounds 15 ounces. This child showed symptoms of intestinal obstruction with vomiting and distention shortly after birth, and was

admitted to the Childrens Hospital on November 18. After preoperative preparation on November 19, exploratory laparotomy was carried out, at which time a 360 degree rotation of the entire small bowel was found about the superior mesenteric vessels. This was corrected without difficulty, and no strangulation was present. A catheter was inserted through a gastrotomy opening in the anterior wall of the stomach and could be passed well into the duodenum and proximal jejunum without difficulty. The child made an uneventful convalescence following this procedure and was dismissed from the hospital on December 3, 1950, entirely asymptomatic.

R. G., white boy, was ten years old when he was first seen August 12, 1948, giving a history of recurrent abdominal pain with vomiting since early childhood. These bouts were recurrent in nature and ordinarily would be relieved by vomiting. X-ray examination was done, which showed malrotation of the colon and upper intestinal obstruction. On August 24, 1948, exploration was carried out, at which time it was observed there was a malrotation of the colon and small bowel, with the cecum lying in the left upper quadrant. The stomach and first portion of the duodenum were enormously dilated, and there were many adhesions which ran anteriorly across the duodenal surface. The adhesions were divided, but there appeared in addition to be marked obstruction of the duodenum by the superior mesenteric artery, and for that reason a duodenojejunostomy was done about the obstruction at the superior mesenteric vessels. The child made a very satisfactory convalescence and was dismissed from the hospital on September 9, 1948. He was last seen September 13, 1948, at which time he was completely recovered and had had no further attacks of obstruction.

Results.—Again the survival rate in these few cases was 60 per cent. As will be noted in the case history, one of our failures seemed to be an early technical success but eventually succumbed to an uncontrollable infectious diarrhea. However, another of our cases is most gratifying, as at the initial operative procedure the prognosis appeared hopeless and nothing definite was done. A secondary exploration carried out a few days later, at which time a rather extensive resection was done, resulted in complete recovery and demonstrates that even the most desperate cases can occasionally be salvaged. It is again hoped that with early diagnosis and skillful surgical management an improved survival rate can be accomplished.

Meconium Ileus

This condition has proved to be one of the most difficult obstructive mechanisms to deal with and is still followed by a formidable mortality. This is not surprising in view of the multiple areas of pathologic involvement which make up the entire picture. Many cases which may survive the obstructive phase initially will eventually succumb to the disease because of the pancreatic and pulmonary pathology.

The differential diagnosis here is of considerable importance, as an occasional case may be salvaged by medical measures. Palpation of the firm abdominal masses and x-ray evidence of areas of calcification and granular-appearing intestinal loops will suggest the proper diagnosis in the majority of cases.

A wide variety of surgical procedures have been attempted and none of them have been uniformly successful. Both of our cases were treated by ileotomy and irrigation and expression of the obstructive meconium. There was one survival.

We have had no experience with the Mickulicz exteriorization procedure recommended by Gross[7] but may employ it in the future.

It would seem that improvement in medical and dietary management as well as better surgical techniques will be necessary for a reduction in the mortality of this discouraging condition.

J. M., white male infant, was born July 15, 1948, with a birth weight of 6 pounds 10 ounces. Shortly after birth it was observed that the child's abdomen became increasingly distended with persistent bile-stained vomitus. X-ray examination showed a high-grade small bowel obstruction, which was unimproved after twelve hours' gastric suction. The child was transferred to the Childrens Hospital, where a diagnosis of bowel obstruction on the basis of meconium ileus or possible volvulus was made. On July 17 exploration was carried out, at which time solid meconium was observed to be blocking the small bowel from the first portion of the jejunum to the ileocecal valve. An attempt was made to decompress the bowel by insertion of a needle, which was unsatisfactory, following which a number 14 catheter was inserted, and it was again impossible to aspirate any of the tenaceous meconium. A transverse incision was made in the terminal ileum, following which a large quantity of saline was injected and the small bowel was milked free of the meconium as completely as possible. The defect in the ileum was then closed with interrupted silk and the abdomen closed. The child made a satisfactory convalescence following this procedure and was dismissed from the hospital in satisfactory condition. The boy was last seen on April 23, 1951, at which time he looked in a very satisfactory condition and had had no respiratory infections.

M. L., white male infant, was born May 17, 1949. This child was born following a normal delivery, but since birth the abdomen had been observed to become

progressively distended with no bowel movements. There was a family history of a four-year-old sibling with congenital pancreatic fibrosis. Physical examination revealed a one-day-old white male infant with a markedly distended abdomen. A lipiodol enema was given, which filled the entire colon, and it was observed that the terminal ileum contained fairly large masses of rather foamy appearing material which suggested a meconium ileus. The child was placed on gastric suction without improvement, and on May 20 exploratory laparotomy was carried out. The terminal ileum was packed solidly with hard inspissated meconium, and a small transverse incision was made, following which a large amount of meconium could be evacuated. About 30 cc. of pancreatic extract were injected into the terminal ileum before the enterotomy opening was closed. Postoperatively the child did fairly well for the first few days and the suction was discontinued on the third postoperative day. The child began to have firm stools about ten days postoperatively, although he occasionally regurgitated his feedings. On the fifteenth postoperative day the child was observed to have a rather profuse diarrhea and became quite dehydrated. The abdomen again became distended and the child expired quite suddenly on June 5, 1949. Postmortem examination revealed fibrocystic disease of the pancreas, pulmonary congestion with bronchopneumonia, and chronic low-grade peritonitis.

Congenital Intussusception

This case[11] is included because after a preliminary survey of the literature it would appear to be exceedingly uncommon. In Gross's[7] series of 702 cases, the youngest patient was three days of age. Clubbe[1], reporting on 270 cases, states his youngest patient was three months old. Perrin and Lindsay[13] in their monograph based on 400 cases, state their youngest patient was one day old. Hogg and Donovan[8] report on 123 cases and state that one patient was less than one month of age.

Because of its apparent rarity the following case is reported:

D. D., white male child, born on March 1, 1943, with a birth weight of 6 pounds 4 ounces. Examination at the time of delivery showed a tear in the right scrotum with a large scrotal hernia on the left. The penis could not be seen because of the edema of the prepuce and scrotum. The child was taken to surgery about twelve hours after delivery. At the time of operation it was observed that the right scrotum had a long laceration about 4 inches in extent, which communicated with an opening in the hernial sac from which bile-stained fluid escaped. The prepuce was retracted, a catheter was inserted into the bladder, and a few cubic centimeters of clear urine was obtained. The hernia was repaired by ligation of the sac, and a similar incision was then made on the left side and a large hernial sac was opened there, and again some meconium-flecked fluid was obtained from the general peritoneal cavity. The hernial sac was ligated and both wounds closed with interrupted silk.

A low left rectus incision was then made, and on opening the abdomen a considerable amount of bile-stained fluid and meconium was present. A search was made for the perforation in the bowel, and this was found where an intussusception had occurred in utero and apparently was several weeks in duration. A segment of intussuscepted bowel could not be reduced, and about 1½ inches of intussuscepted bowel, which appeared to be mummified, was resected. It was determined then that the bowel at the point of intussusception had been lacerated nearly across the entire lumen and allowed the escape of the bile and intestinal contents to distend the abdomen and thus push out the hernial sacs, which had then become ruptured during delivery. An end-to-end anastomosis was carried out. Four grams of sulfanilamide powder were left about the anastomosis and closure was carried out with interrupted catgut. The following day, March 2, because of marked edema of the prepuce, a dorsal slit was carried out and a soft number 8 catheter passed into the bladder. Postoperatively intermittent gastric aspirations were carried out and some old bloody clots were observed to be passed on about the sixth day, but this subsequently stopped. Feedings were started on the ninth postoperative day, and the baby was discharged from the hospital on April 9, 1943, on the thirty-ninth hospital day, with a weight of 6 pounds 11¾ ounces. The child was last seen on December 23, 1947, at which time the abdomen was excellent and both testes were in the scrotum. The child was otherwise normal.

TABLE II. SUMMARY OF ALL PATIENTS

Location	No.	Living	Dead
Atresia duodenum	7	5	2
Stenosis duodenum	5	3	2
Atresia jejunum	2	1	1
Absence ileum and cecum	1	0	1
Stenosis colon	1	1	0
Volvulus of small bowel and malrotation of colon	5	3	2
Meconium ileus	2	1	1
Congenital intussusception	1	1	0
Total	24	15(62%)	9

Summary and Conclusions

1. Atresia and other obstructions of the intestine occur more commonly than is generally realized.

2. Early diagnosis and improvements in preoperative and postoperative care and in anesthesia have improved the survival rate considerably.

3. Although a significant percentage of these children will always be lost because of associated incompatible anomalies, a far greater number can be salvaged and be restored to lead entirely normal lives.

(Continued on Page 664)

Industrial Deafness

Every Physician's Problem

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ESTIMATES suggest that 80 per cent of practicing physicians do some degree of industrial medicine. It is safe to assume that the remaining 20 per cent occasionally are asked for an opinion concerning loss of hearing. The above estimates justify the title of this presentation.

Loss of hearing resulting from exposure to loud sounds is not uncommon. All workers exposed to high levels of noise for a period of years lose some hearing. The loss is insidious in onset. The initial loss of hearing occurs for high-frequency sounds that are not present in the conversational voice; thus, the loss is well developed before it is recognized by the patient. The first sign of hearing loss of this type usually is poor understanding for conversation, especially in a background of noise from other voices or when the speaker is at some distance from the listener. Initial recognition often occurs in the home, where radio or television interferes with understanding of conversation. When this complaint is presented and the history indicates exposure to loud noises, a diagnosis of deafness resulting from acoustic trauma must be considered.

Industrial deafness is not a new subject. Fosbroke[1] mentioned blacksmith's deafness in 1831, referring to "modern and older writers on the subject." For many years, loss of hearing was accepted by workers as the inevitable accompaniment of employment in noisy industry. With increased application of power in industry, greater numbers of workers are exposed to noise of potentially damaging intensity. Concurrent with increase in exposure to noise has been a change in philosophy that tends to hold the employer responsible for injurious consequences of employment. Loss of hearing caused by noise falls into this class and has become compensable under the workmen's compensation laws of several states.

The pressure of increasing numbers of claims for compensation has been the instigation of a number of studies of the effect of noise on hearing. The most comprehensive study is being directed by the Subcommittee on Noise in Industry of the Committee on Conservation of Hearing of the American Academy of Ophthalmology and Otolaryngology. This study has the active cooperation of labor and management, as well as financial support of the insurance industry. The studies in progress include long-term observation of workers exposed to various degrees of noise; when completed, they should add significantly to knowledge of the subject.

TABLE I. ENERGY VALUE OF THE DECIBEL

Decibels	Energy units
0*	1
30	1,000
60	1,000,000
90	1,000,000,000
120	1,000,000,000,000

*Accepted value for 0 decibel=0.0002 dyne per square centimeter.

Nature of Sound

Sound is a form of energy propagated as a wave motion through various media. Air is the only medium pertinent to the problem in question. Noise has been defined as unwanted sound. Sound has three dimensions, namely intensity, frequency and duration.

The intensity of sound can be measured and is expressed as pressure exerted on a given area of surface. The unit of sound energy is the decibel, which is a logarithm to the base 10 representing the energy content of the sound. Thus, if 0 decibel represents 1 unit of energy, 10 decibels represent 10 units, 60 decibels represent 1,000,000 units and 120 decibels represent 1,000,000,000,000

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units of sound energy (see Table I). We may marvel that an organ capable of stimulation by 1 unit of energy is capable of withstanding a trillion times that force. Some industrial noises may reach peaks as high as 150 decibels.

noise in industry. The physiologist accepts the value of 0 decibel as the average threshold of hearing by a group of young adults who have no known defect of hearing. This is the scale used on the audiometer. In this scale, the energy value

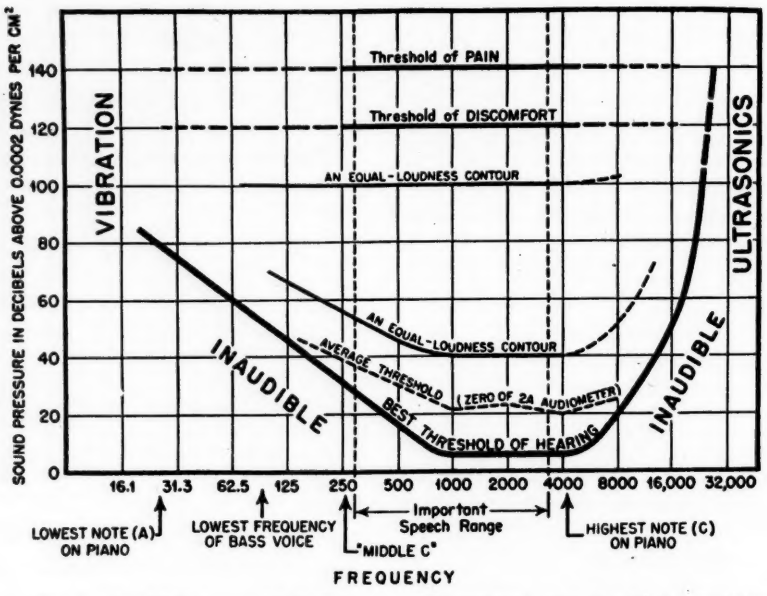

Fig. 1. Sensitivity range of human ear. (Reproduced with the kind permission of the publisher from Glorig, Aram and Wheeler, D. E.[2])

The frequency of a sound refers to the number of vibrations occurring in a unit of time and is commonly expressed as cycles per second. Frequency determines pitch. Doubling the frequency of a tone raises the pitch by one octave. The frequency of "middle C" on the piano is 256 cycles per second. Sounds made up of a single frequency or harmonious frequencies are called "tones." Sounds comprising mixed or unharmonious frequencies are called "noise."

Intensity and frequency are both important to the problem of loss of hearing. The human ear is most sensitive to the frequencies represented in the conversational voice. It follows that the ear is damaged most easily by noises made up of these frequencies.

The energy required to stimulate the ear is much greater for high and low frequencies than it is for the middle frequencies (Fig. 1). This has led to the adoption of two sets of values for the decibel. The physicist has set the value of 0 decibel at 0.0002 dyne per square centimeter. This value is used for measurement of levels of

of 0 decibel differs for each frequency but approximates the physicist's value for the middle range of frequencies.

Measurement of Noise

The measurement of noise is the function of the acoustic engineer. Using calibrated equipment, he can determine the over-all intensity of noise and the intensities present at various frequencies (Fig. 2). Three types of equipment are required. A noise-level meter is used to measure sounds of reasonably constant intensity, and an oscilloscope is used to measure impact-type noises of short intensity. The frequency analyzer can be used in conjunction with either instrument.[2]

Effects of Noise on Man

Kryter[3] reviewed the literature on the effects of noise on man. Working in noise apparently has no effect on the ability to concentrate or on the output of work. However, auditory communication is hampered to a pronounced degree, which varies with the ratio of loudness between noise

and signal. The human larynx lacks the power to be heard over noises of extreme loudness.

Experience shows that prolonged exposure to loud noise will damage hearing. How much noise and how long an exposure can be tolerated remain

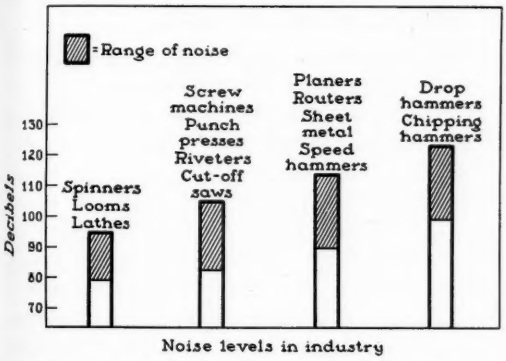

Fig. 2. Levels of noise in various industrial processes. (Reproduced with the kind permission of the publisher from pamphlet issued by the American Academy of Ophthalmology and Otolaryngology.[6])

undecided. Individual susceptibility to acoustic trauma varies greatly and as yet there is no valid predictive test to determine which individual ears are "tender." Prolonged exposure to noise having an intensity of 90 to 100 decibels will damage some highly sensitive ears; 100 to 120 decibels will damage most ears and intensities of more than 120 decibels will damage all ears.[4]

Loss of Hearing from Noise

Loss of hearing that results from exposure to loud noise is of the perceptive type. The loss is primarily for high tones, and bone-conduction thresholds parallel air-conduction thresholds. Audiometric evidence, in the form of a dip at 4,000 cycles per second, precedes awareness of the loss (Fig. 3). The deficit in hearing is progressive with continued exposure to loud noise but is most rapid at the inception of exposure. Two types are recognized. Reversible loss, called "auditory fatigue" or "temporary threshold shift," is most prominent in the early stages of exposure to noise. It is accompanied by a sense of fullness in the head and by tinnitus. Many normal persons experience this after exposure to loud noise, such as shooting. The symptoms usually subside within twenty-four hours. Permanent loss of hearing develops more gradually.

Observations on animals which have been exposed to intense noises reveal degenerative changes in the cochlea. Microscopic studies indicate a correlation between demonstrated loss of hearing and cochlear lesions.[5]

Perceptive deafness results from many causes, all of which must be considered in making the

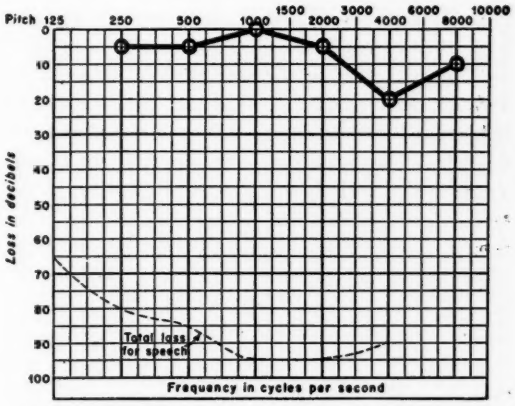

Fig. 3. Audiogram characteristic of early acoustic trauma.

diagnosis of acoustic-trauma deafness. Presbycusis, the loss of hearing due to age, closely parallels industrial deafness. The history often renders it possible to recognize the etiologic factors in deafness caused by injury, sickness, drugs or toxins. Recognition of acoustic trauma is important from the standpoint of prevention of further loss and because of the factor of compensation.

Loss of hearing that affects the high tones usually is not recognized until it reaches the frequency range of the conversational voice. Impairment of threshold at 2,000 cycles per second causes decrease in ability to recognize consonants. Thus, the patient is able to hear the voice in conversation but finds difficulty in understanding. Comprehension is greatly depressed in the presence of noise of any sort and by weakening the signal from any cause, such as distance. Hearing is extremely poor for whispers.

Prevention of Deafness

Deafness in general is not preventable. Deafness caused by exposure to noise is preventable to a large degree. Elimination of deafness as an industrial hazard is possible, just as silicosis has been eliminated as an industrial disease. Prevention of industrial deafness requires a threefold program of tests for hearing, engineering and protection of the ear.[6]

The testing program includes pre-employment

tests for every new employe. Repeat tests should be done after thirty to forty-five days of exposure to noise. At this point, workers who show significant change in threshold should be transferred to a less noisy environment. Regular recheck is advised every six to twelve months thereafter. Repeat tests always should be done at least twenty-four hours after the last exposure to noise. The test recommended is the pure-tone air-conduction audiogram, including frequencies at octave and half-octave intervals from 250 to 8,000 cycles per second. Repeatability of tests depends on standardization of technique. The level of noise in the testing room should not exceed 50 decibels. The room should be in a quiet location away from roadways, steam pipes and heavily travelled corridors. Acoustic insulation usually is required to achieve the desired levels of sound. The audiometrist should follow a standard technique for establishing the threshold of hearing, and the audiometer should be calibrated at frequent intervals.

Engineering methods include isolation of noisy zones, absorption of sound and prevention of noise at its source by design of the machines involved.

Protection of the ear is accomplished by means of earplugs, ear muffs or helmets. Earplugs are most acceptable to the workers but still are not popular. Protective devices interfere with hearing in quiet but many actually improve hearing in loud noise by reducing the distortion that occurs when extremely loud sounds are impressed on the ear.

Compensation

Deafness caused by noise in industry is recognized presently in many states as a compensable disability. Formulas for evaluating loss of hearing in terms of percentage disability as a basis for compensation have been adopted in several states. The problem of compensation for loss of hearing is only now arising in Minnesota; this delay perhaps reflects the small number of workers employed in noisy industries in the state. Increase in noisy operations, as in the developing taconite industry, suggests that this problem will grow in Minnesota.

Minnesota at present has no specific law covering compensation for loss of hearing caused by noise. Cases arising on this basis probably will be considered under the section of the compensation laws dealing with occupational disease.

The Committee on Conservation of Hearing of the Minnesota State Medical Association has submitted recommendations for evaluation of loss of hearing to the Industrial Commission of Minnesota. The aim of the Committee is to aid in establishing a uniform and equitable formula for settlement of such claims, based on the best available scientific and medical information.

Physician's Role in Hearing-Conservation Programs and Compensation

The industrial physician, with the consultation of an otologist, should be the director of programs for the conservation of hearing in industry. It should be his duty to organize and supervise the program of tests for hearing and to assure himself of the qualifications and training of the audiometrist. He should, with the advice of the otologist, establish requirements for employment. The advice of the otologist should be sought in the placement of persons who do not meet established requirements. Workers who show changes in hearing on follow-up tests should be referred to the otologist for evaluation and advice.[7]

Evaluation of the hearing of candidates for compensation should be the responsibility of an otologist experienced in problems of hearing. The otologist should report the degree and type of loss of hearing and estimate the effect of employment in its causation. In this role, he should act as an impartial expert. The determination of compensation is not a medical function and should be entirely the responsibility of the Industrial Commission.

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A Clinical Method of Assessing Drug Therapy in Parkinsonism

With Special Reference to Psychologic Factors

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PREVIOUS reports of methods of assessing therapeutic effect of new drugs in Parkinsonism have failed to consider adequately the psychotherapeutic effect of the change in medication. Some have maintained that there is a direct relationship between the enthusiasm of the doctor and the therapeutic effect of the new medication. Others have raised the objection that the improvement of the patient following a change in medication is due to the psychic uplift which the patient derives from such a change, and not due to any pharmacologic action of the drug itself. In devising the present method for assessing new drugs, the above factors were taken into consideration and an effort made to minimize their importance. In addition to the clinical method for assessment of drug therapy which was evolved, interesting observations were made as to the emotional factors encountered in assessing new drugs in Parkinsonism.

Clinical Study

Phenergan,® Diparcol® and a placebo were used in this study. Diparcol, a synthetic compound (diethylamino, 2,ethyl-N, dibenzo-parathiazine hydrochloride) available in 62.5 mg. enteric coated tablets, produces parasympatholytic effects, and early reports[1-3] indicated it might be of use in the treatment of Parkinsonism. Phenergan (diethyl-amino-2-methyl-l-ethyl)-N-dibenzoparathiazine) belongs to the group of anthistamines and was provided in 25 mg. tablets for this study. The enthusiastic report of Budnitz[4] on the use of antihistamines in the treatment of Parkinsonism provided the rationale for the assessment of this drug.

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Phenergan, Diparcol and a placebo were delivered to the dispensary without ever having been seen by the examiner, so that he would not be familiar with the physical characteristics of these compounds. The dispensary assigned the the following numbers to each of the compounds: 2000-I, 2000-II, 2000-III. The key to the identity of the drugs was held only by the dispensary, and not until this study was completed and the results tabulated was their composition revealed to the examiner. Throughout the course of this study, the patients were seen exclusively by the author and thus psychic factors contingent upon change of the patient-doctor relationship were kept constant for the whole group.

The patients were studied for a six-month period. It was felt that the initial psychic effect of a change in medication would be dissipated over this period of time. The patients were urged to continue with their new medication in spite of ill effects or in spite of any deterioration in their condition. Only when the patient refused to continue or his clinical condition made a change mandatory was other medication substituted. Six patients received one or more of the compounds, two patients receiving all three.

No effort was made to select the patients for this study and thirty consecutive patients attending the Parkinsonism clinic were studied. To the first ten 2000-I, to the second ten 2000-II, and to the last ten 2000-III, was administered. Previous medication was stopped and the new medication substituted. The patient's condition was assessed both objectively and subjectively at frequent intervals during the study. It was thus possible to compare the early responses of the patient to the medication to the response at the termination of that medication. The objective

criteria by which the patients were judged for evaluation of drug therapy are as follows:

1. Time taken to dress.
2. Ability to comb hair.
3. Ability to wash.
4. Ability to shave.
5. Ability to clean teeth.
6. Ability to get in and out of a chair.
7. Distance the patient is able to walk.
8. Ability to write.
9. Time taken for an average meal.
10. Ability to hold and read newspaper.
11. Other evidence of improvement.

They concerned functional activities of the patient, primarily daily self-care and ambulation, and a significant improvement in one or more of these activities was recorded as a good result. The subjective response of the patient was correlated with his objective performance and did not constitute the basis for assessment of the efficacy of the drug.

Results

Since two patients failed to return to the clinic, the remaining twenty-eight constitute the basis for this report. Eleven patients received 2000-I, thirteen patients received 2000-II, and thirteen patients received 2000-III, later identified as Phenergan, placebo and Diparcol respectively.

In all the patients receiving 2000-I (Phenergan), the results were very poor. Their symptoms became so severe that only two were able to complete the six-month trial. Three of the patients complained of mild transient nausea, dryness of the mouth and dizziness. Similarly the condition of the patients receiving 2000-II (placebo) deteriorated and only two patients were able to complete the six months of treatment. Transient dizziness was mentioned by two of the patients receiving 2000-II (placebo).

However, in the group of patients receiving 2000-III (Diparcol) two patients (Cases 17 and 23) achieved results superior to those obtained from all previous medications. In the remainder of the patients in this group, the results of 2000-III (Diparcol) administration were poor. The high incidence of toxic symptoms was responsible for the large number of poor results. In two patients the toxic symptoms, consisting of nausea, vomiting, hyperthermia and leukopenia, necessitated immediate discontinuance of the drug. In six additional patients nausea, vomiting and dizziness were encountered. One of these patients complained of tenesmus.

Of particular interest was the comparison in the group receiving the placebo (2000-II) between the initial and final assessments. Any improvement in the clinical condition of the patients in this group must of necessity be due to psychic factors. In three (Cases 8, 27, 9) of the thirteen patients in this group the initial assessment at the end of thirty, forty-two and sixty days respectively, revealed a favorable response. However, by the end of 110, 56, and 120 days respectively the results had become poor.

In twenty-two of the twenty-eight patients there was a direct correlation between the objective clinical response of the patient, as measured by the criteria outlined above, and the subjective response of these patients to their change in medication. In the remaining six patients there was a marked discrepancy between the patient's favorable subjective response and the objective clinical picture.

Case 1, while receiving 2000-I (Phenergan), and Case 22, while receiving 2000-I (Phenergan) and 2000-II (placebo), reported definite subjective improvement while their objective clinical picture remained unchanged. In Case 2 on 2000-I, in Cases 10 and 27 on 2000-II, and in Case 28 on 2000-III (Diparcol), there was a definite deterioration in the patient's condition while they continued to state that they felt improvement.

Comment

To our knowledge, this is the first study on drug therapy in Parkinsonism in which the objectivity of the examiner was insured by the fact he did not know which of the patients were receiving placebos and which were receiving the active drugs. The fact that three of the patients receiving placebos achieved a good therapeutic effect for a period of one to four months stresses the importance of allowing a sufficient period of time to elapse before a report on a new drug is made. We feel that six months constitutes a minimum period and that preferably a year should elapse. The danger of relying solely on the subjective statement of the patient as to the efficacy of his medication is pointed out by the fact that in six of the patients their clinical condition failed to show improvement or actually deteriorated, while subjectively they reported a good result.

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Cardiac Arrest

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CARDIAC arrest may occur at any time during the anesthetic and operative procedure. Although cardiac arrest is more prone to occur in certain types of operative procedures, nevertheless the danger of cardiac standstill is omnipresent and both the surgeon and the anesthesiologist must be keenly aware of this danger.

The first recorded anesthetic death occurred in Newcastle-upon-Thyne on January 28, 1848, and a recording of the inquest appeared a short time thereafter (Fatal Application of Chloroform, 1848).[1] The patient was a fifteen-year-old girl who was subjected to chloroform while undergoing removal of the nail from the great toe of the right foot because of onychia. Death occurred three minutes after the first inhalation of chloroform, and when the case came to trial the jury's verdict was "we are unanimously of the opinion that the deceased, Hannah Greener, died from congestion of the lungs, from the effects of chloroform, and that no blame can be attached to Mr. Meggison, surgeon, or to his assistant, Mr. Lloyd."

Within two weeks after the recording of this death the comments of Simpson (who had introduced chloroform clinically two months earlier) appeared in the same journal.[2] Simpson wrote "The unfortunate patient certainly died when under the influence of chloroform, not however, as I believe from its effects, but from the effects of the means used to revive her . . . the girl died, then, as I conceive . . . choked or asphyxiated by the very means intended to give her life." (Meggison had dashed water in the patient's face and had given her some brandy, a little of which she swallowed with difficulty).

A single unsuccessful attempt to resuscitate a young woman who collapsed under chloroform was reported by Steiner in 1871,[3] and the method used was "electropunctur" of the heart.

The second recorded attempt to resuscitate a human heart by direct cardiac massage appeared in 1898 (Tuffier and Hallion.)[4] The patient was a twenty-four-year-old man who exhibited cardiac arrest five days after the drainage of an appendiceal abscess. By means of direct intrathoracic massage the heart action and respiratory movements returned for a few minutes but then ceased. The autopsy examination revealed a large pulmonary embolus.

In 1902 Starling and Lane[5] reported the first complete recovery following cardiac arrest. The patient was a sixty-five-year-old man, under ether anesthesia, who had a laparotomy for adhesions about the colon. The subdiaphragmatic route of cardiac massage was utilized and after a "squeeze or two . . . felt it re-start beating." Artificial respiration was continued for twelve minutes when natural respiration recommenced.

Keen[6] reviewed the literature on cardiac massage up to the year 1904 and among the twenty-seven cases of cardiac massage which he reported was one of his own cases and a case of Igelsrud. Doctor Kristian Igelsrud of Norway had not reported his case previously, although it was the first successful cardiac resuscitation (1901). Igelsrud's patient was a forty-three-year-old woman who had an abdominal hysterectomy performed under chloroform anesthesia. Direct cardiac massage (intrathoracically through an opened pericardium) was instituted within four to five minutes after the heart arrested. The patient made a good recovery and was discharged from the hospital after five weeks.

A very good review of the literature on cardiac resuscitation appeared in 1949;[7] and in 1953 Stephenson, Reid and Hinton[8] reported a collection of 1,200 cases of cardiac arrest.

Precipitating Factors in Cardiac Arrest

The following conditions increase the likelihood of cardiac standstill or ventricular fibrillation: hypoventilation with resultant hypercapnia and possibly hypoxia, metabolic acidosis, reflex stimulation under light anesthesia, underlying cardiopulmonary disease, overdosage and multiplicity of anesthetic agents, displacement and torsion of the heart, sudden drop in blood pressure, and rapid

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changes in blood pH. It is unusual for any one of these precipitating factors to be the sole cause of cardiac arrest, for predisposing conditions are frequently coexistent, complementary and cumulative.

Hypoventilation with air will result in a fall in alveolar and arterial oxygen tensions and a rise in alveolar and arterial carbon dioxide tension. However, hypoventilation with 100 per cent oxygen rarely leads to hypoxemia, but instead leads to carbon dioxide retention. Hypoxemia is usually grossly detectable, as the patient's blood becomes darker in color, but gross evidence of hypercapnia without coexistent hypoxia is lacking. Furthermore, since surgical patients are usually ventilated with gas mixtures containing a high concentration of oxygen, hypo-ventilation leads to hypercapnia without an associated hypoxia. Hypoxia without hypercapnia can be produced only by adequate alveolar ventilation with a low oxygen gas mixture, and clinically this is rarely seen. Finally, it would appear that hypercapnia with or without hypoxia is the usual ventilatory problem in patients undergoing operative procedures. Experimental evidence indicates that hypercapnia or asphyxia augment the cardio-inhibitory effects of vagal stimulation, whereas hypoxia per se does not.[9]

Metabolic acidosis tends to potentiate the responses to vagal stimulation and diminish the responses to sympathicomimetic agents.[10,11]

Because vagal stimulation is inadvertently produced at the time of endotracheal intubation or extubation, when the patient is somewhat light and reflexes are less depressed, the occasional cardiac arrests encountered at such times are probably more than coincidental. In fact, Shumacker and Hampton[10] reported five deaths in patients with cardiac disease simultaneously with aspiration through or removal of an endotrachael tube. Mismanagement of anesthetic agents can lead to cardiac arrest; for a good anesthesiologist is a toxicologist with an interest in and a knowledge of cardiorespiratory physiology.

Displacement and torsion of the heart may result in impaired venous filling, impaired coronary flow, et cetera; and a sudden drop in blood pressure provokes a fall in myocardial perfusion. Rapid and major changes in blood pH may occur during surgical procedures as Stead et al[13] and Miller et al[14] have demonstrated.

In general, a rapid change towards an acid blood pH may produce bradycardia and possibly cardiac standstill, whereas a rapid change towards a hyperalkaline blood pH may result in tachycardia, ventricular extrasystoles and ventricular fibrillation.

Diagnosis and Treatment

Frequently the anesthesiologist diagnoses cardiac arrest and reports that he is unable to obtain a pulse or blood pressure. The surgeon should immediately confirm this by palpating an artery in the operative area, or if the chest is open the surgeon should inspect and/or palpate the heart directly.

The successful treatment of cardiac arrest is dependent upon the immediate artificial ventilation of the lungs with oxygen and immediate artificial circulation by manual compression of the ventricles.

No time should be wasted with prolonged auscultation over the chest, with observation of the electrocardiogram, with retinoscopy or with intracardiac drugs. An incision should be made below the left nipple (fourth or fifth interspace) from the sternal border to the mid-axillary line. If no bleeding occurs, the diagnosis of cardiac arrest is confirmed. Since irreversible brain damage occurs in humans after three to four minutes of absent cerebral perfusion, there is no time for procrastination, vacillation or consultation. The chances for successful cardiac resuscitation rapidly diminish as seconds pass. Immediate therapy by relatively unskilled personnel may prove life-saving, whereas a delay of much longer than three to four minutes denies the patient full recovery despite any mortal efforts.

Ventilation of the lungs is most effective through an endotracheal tube, although a tight fitting mask or even mouth-to-mouth breathing has been successful. There is no danger from hyperventilation in a patient with cardiac arrest, whereas, hypo-ventilation perpetuates acidosis and arrest. Consequently, hyperventilation of the patient is probably an important factor in the recovery rate of these patients.

Cardiac massage, or more accurately, artificial circulation by manual compression of the ventricles is most effectively carried out through a thoracic incision. The ventricles should be compressed forty to eighty times per minute, depending upon the adequacy of diastolic filling of the ventricles. If the patient is placed in a moderate

Trendelenburg position, venous filling of the heart is aided. At this juncture the patient will usually have a blood pressure of 50 to 90 mm. of mercury. Once effective ventilation and massage are started, the emergency is over. Ventricular standstill must be differentiated from ventricular fibrillation, since the successful treatment of fibrillation requires electrical shock.

Epinephrine is the drug of choice in cardiac standstill and the dose required is variable. It is better to give multiple small doses (.5 to 1 cc. of a 1:1000 solution) rather than a single large dose, since the latter may convert standstill into fibrillation. If the heart seems refractory to epinephrine, molar sodium lactate solution (20 to 40 cc.) should be injected into the heart. Sodium lactate or sodium bicarbonate will tend to correct the acidosis, and under conditions of acidosis the heart is less responsive to epinephrine.[15] If large volumes of citrated blood have been given prior to the onset of cardiac arrest, intracardiac 10 per cent calcium chloride may prove helpful in restoring myocardial tone. The ideal treatment in ventricular fibrillation obtains a well-oxygenated, well-perfused myocardium with good muscular tone prior to attempting electrical defibrillation. This requires adequate ventilation, effective manual compression of the ventricles and at times intracardiac epinephrine, molar sodium lactate and calcium chloride. Wiggers[16] has demonstrated very clearly the ease with which ventricular fibrillation can be corrected with electrical shock if the myocardium is well oxygenated and has good muscular tone.

Electrical shock is applied to the ventricles with two broad contact insulated electrodes—one electrode on the posterior ventricular surface and one electrode on the anterior ventricular surface. The pericardium should be opened prior to attempts at electrical defibrillation in order to localize the effectiveness of the electrical shock. If the heart does not become defibrillated after the application of one to three shocks (110-250 volts for 0.1-0.3 seconds), the procedure should be temporarily abandoned and vigorous massage should be reinstituted for 1.5 to two minutes, until the myocardium becomes pink once again. A dilated, cyanotic heart is unlikely to be defibrillated and prolonged attempts with electrical shock will result only in burning the myocardium.

Once the heart resumes an effective beat following massage and/or defibrillation, the wound area can be prepared and sterile instruments should be obtained for wound closure. The pericardium should be loosely approximated, for a pericardial closure of this type will prevent displacement of the heart into the pleural cavity and still permit egress of pericardial fluid. The left pleural space should be drained with a large catheter and one million units of penicillin should be instilled into the pleural cavity. Oxygen should be administered via a nasal catheter postoperatively, and meticulous efforts must be made to keep the tracheobronchial tree free of obstructing secretions.

A selected case history is presented illustrating, particularly, an instance in which successful ventricular defibrillation with return of effective cardiac rhythmicity was not accomplished until the underlying cardiac valve defect for which the operation was performed, had been corrected.

Case Summary

Mrs. A. L. T. (U.H. #889145), a forty-five-year-old housewife, was admitted to the University Hospitals with a thirty-year history of rheumatic heart disease with severe mitral stenosis. She had marked dyspnea even on slight exertion and had experienced three major embolizations (cerebral, femoral and splenic) in the three years prior to this admission. The patient had a typical grade IV mitral stenosis murmur, electrocardiographic evidence of right ventricle strain and auricular fibrillation, and roentgenographic examination showed cardiomegaly, left atrial enlargement and prominent pulmonary vascular markings. The patient was brought to the operating room for mitral valvotomy on October 28, 1955. Induction of anesthesia was satisfactory, but as the endotracheal tube was inserted the patient suffered cardiac arrest. An immediate bloodless thoracotomy incision was made through the left fifth interspace anteriorly. The pericardium was opened and the heart was in standstill. After massage and intracradiac epinephrine, ventricular fibrillation appeared. The anesthesiologist ventilated the patient with 100 per cent oxygen and the ventricles were compressed manually at a rate of sixty to seventy per minute. Electrical defibrillation of the heart was accomplished but the cardiac rhythm and tone appeared sluggish. Intracardiac molar sodium lactate was given with only a slight if any beneficial effect. Consequently, the patient was rotated to a left anterolateral position and a mitral valvotomy was done in an expeditious fashion. The mitral valve was very stenotic and would admit only the tip of the index finger. The anterior and posterior commissures split rather easily, but during the intracardiac manipulations the heart again developed ventricular fibrillation. The finger was removed from the heart and the purse string around the base of the left auricular appendage was ligated. Electrical defibrillation was successful once more, and subsequently the cardiac rhythm and tone appeared to be good. The chest wound

was closed after the insertion of two chest catheters and the instillation of one million units of penicillin into the left pleural cavity.

The patient developed an infarction of the right lower lung lobe six days postoperatively, but this regressed with anticoagulant and antibiotic therapy. She developed some confusion and disorientation two weeks postoperatively. A serum sodium determination at that time was found to be 126 milliequivalents per liter. The mental confusion disappeared when the hyponatremia was corrected and the patient was discharged from the hospital on November 19, 1955.

Summary

A brief review has been made of early reports of clinical cases with cardiac arrest. The various known precipitating factors in cardiac arrest have been emphasized—i.e. hypoventilation with resultant hypercapnia and possibly hypoxia, metabolic acidosis, reflex stimulation under light anesthesia, underlying cardiopulmonary disease, overdosage and multiplicity of anesthetic agents, displacement and torsion of the heart, sudden drop in blood pressure, and rapid changes in blood pH.

The diagnosis and treatment of this condition has been outlined, and a brief case summary has been presented.

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CONGENITAL OBSTRUCTION OF THE SMALL INTESTINE AND BOWEL

(Continued from Page 654)

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Recent Advances in the Field of Homologous Transplants

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THE past few years have been witness to several striking medical advances. Intracardiac surgery, for example, is now performed at many medical centers. As an expression of advancement in another important area it now appears that one of the most baffling medical problems is near to solution: the mechanism(s) involved in the rejection of homografted tissue. Little imagination is required for one to visualize the potential therapeutic possibilities of successful homografting. Chronic nephritis, endocrine deficiencies, and safer management for extensive burns are but a few of the many afflictions which might immediately benefit. Technically, almost any organ or tissue, except perhaps the brain, can be transplanted. Liver, heart, kidney and lung have already been relocated with short term survivals in the laboratory.

However, successful clinical homografting is not possible with our present knowledge. Although there are occasional reports of homograft survival, almost all such cases involve identical twins.[1] Cases of successful homografting between unrelated individuals are medical curiosities.[2,3] Fetal parathyroid tissue has been homotransplanted with some success, but results are not uniform and failures are common. In the following discussion a clear distinction must be maintained between autograft and homograft. With autografts, tissues from an individual grafted back onto the same individual uniformly survive permanently and function normally if proper attention is given to technical details. Homografts, however, are foreign to the host and elicit a rejection pattern which is now the subject of intense study in many medical centers.

Homografts fall into two categories, and the difference between each is important. Homostatic grafts serve merely as scaffoldings for the ingrowth of host tissues, but do not function or survive permanently. This type of homograft has found clinical use as a blood vessel or bone prosthesis. Homovital grafts, on the other hand, survive and function in the new host (skin, thyroid, adrenal cortex, et cetera). The rest of this discussion is concerned with the latter type of transplant and the scientific attempts to prolong their survival periods.

It is currently accepted that homotransplant rejection is based on immunologic mechanisms. Very recently, convincing evidence has been offered that there is formation of specific antihomograft antibodies by the host.[4] This adds the final link in the chain of evidence that the host reacts to homografts and foreign proteins or other antigens in a similar fashion. It is probable, however, that both cellular and ordinary antibodies are involved in homotransplant immunity. Medawar[5] has shown that a second skin graft from the same donor to the same recipient will be destroyed at a greatly accelerated rate compared to the first graft between the animals. This "second-set" phenomenon gives a firm foundation to the immunologic theory of homograft rejection. It has been repeatedly confirmed for various organs and tissues in several species of animals.[6,7] Lymphatic absorption of graft antigen appears to be necessary for anti-skin homograft antibody formation.[8] This is shown by the failure of skin grafts in the brain and anterior chamber of the eye (both areas thought to be lacking in lymphatics) to evoke homograft immunity. It has been shown, however, that a homografted kidney completely encased in a plastic bag except for vascular connections, is destroyed at the usual rate.[9] This demonstrated that lymphatic antigen absorption is not necessary for the usual rejection pattern in this organ transplant system.

Although the finer points of these phenomena are not as yet clarified, there are several recent important pieces of research which have a very direct bearing on the problem. Perhaps the most exciting is the discovery of the general principle that exposure of animal fetuses, either *in utero* or in the immediate newborn period, to proteins or

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living cells from another unrelated animal will immunologically alter the injected animal—presumably for life. The mature fetuses will be unable to form antibodies against the injected material. They will, therefore, accept homografts from the donor animal. This has been demonstrated with skin homografts in both mice and rats.[10,11] Tumors which normally fail to grow in certain strains of mice will grow and kill the animal if tumor cells are injected into fetal or newborn mice of the resistant strains.[12,13,14] Although much basic work remains to be done, there is a fascinating possible clinical application of the principle of "active acquired tolerance," as it is called. If white blood cells or other tissue cells from several adults were injected into human newborns, it is probable that the injected baby in adulthood would accept, permanently, homografts from the donors of the cells. If attempts at homografting in humans in this manner are successful, a large percentage of our future population could be "immunized" at birth and tissue donors would be available at all times during their lives.

Other possibilities are being investigated. It has been found that patients with "agammaglobulinemia"[15], a disease in which there is an absense of gamma globulin in the blood and no humoral antibody formation, will accept homografts permanently. The complete nature of the immunologic defect in agammaglobulinemia is as yet undefined, but studies on the condition will undoubtedly yield much important data. Clinical efforts to produce agammaglobulinemia in an effort to achieve homograft survival must await these clarifying data. Attempts at "desensitization" or "immunoparalysis" have been successful in some animal experiments, with permanent survival of homografts in those animals pre-treated with donor cell extracts.[16] These successful experiments have not been duplicated by other workers and there has been no human application to date. Many other attempts to prolong homograft survival have been made, including radiation of donor and host[17] and the administration of cortisone and ACTH.[18] Some prolongation of graft survival has been obtained in isolated instances, but no permanent survivals have been recorded.

One of the most fascinating aspects of "acquired tolerance" is the demonstration that injection of normal tissues *in utero* in mice will render the fetus "tolerant" not only to tissue from the donor mice strain, but their tumors as well.[19] Although our goals in cancer and homograft research are opposite—with permanent survival sought after in one case and total rejection in the other—these techniques offer a promising approach to unraveling the biologic differences between tumor and normal tissue. It is indeed likely that significant advances in one area will lead to similar progress in the other.

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Comparative Effectiveness of a Weighed Reduction Diet and an Approximate-Measure Diet

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DIETS restricted in calories to bring about reduction of weight in obese persons may be divided into two categories, namely, a weighed diet that requires use of gram scales to measure the allotment of food and a diet that requires only approximate measure of the food.

Some authorities continue to recommend the weighing of food in a diet that is restricted in calories. Evans and Strang,[1] in 1929, considered that the same metabolic insight should be used in the dietary treatment of obesity as in the dietary treatment of diabetes. Wilder[2-4] stated that a diet for reduction of weight demands the same attention to quantitative considerations as does a diet for diabetes and that for a time, at least, the patient should be required to weigh his food. Newburgh[5] said that reduction diets should be weighed, and Barborka[6] stated that a diet prescribed for the more resistant types of obesity should be accurately weighed. Meiklejohn[7] considered it best that all foods be weighed in restricted-calorie diets, at least at first.

Since the early 1930's, most reduction diets of less than 1,000 calories have been weighed for patients at the Mayo Clinic. Those for whom such a diet has been ordered have been taught to weigh their food if they are to continue with the diet at home. They must have at least three, and usually four, consultations with the dietitian. Those not required to weigh their food and who use approximate measures have only one consultation with the dietitian. Thus, much more time is devoted to instruction of the person who is to follow the weighed reduction diet.

The purpose of the present study is to compare the loss of weight of obese patients instructed in a weighed reduction diet with that of patients instructed in an approximate-measure reduction diet.

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Selection of Patients

It was decided to select the persons for this study from those who had been instructed two years previously (1953). This was to allow sufficient time for grossly overweight persons to have reached their ideal weights. Also, by such a lapse of time, differences in loss of weight due to differences in caloric levels of the reduction diets would tend to have been cancelled. In order to have at least 100 persons in the group for weighed reduction diets, it was necessary to include a few who had received instructions three years previously. Therefore, all patients who had received instructions in the weighed reduction diet in 1953 and a few obtained at random from the 1952 group were included. None of these patients had required special features in the reduction diet, such as restriction of sodium or of residue. There were 103 persons in this group. The diet contained 624 calories, with 62.5 gm. of protein, 17.5 gm. of fat and 54 gm. of carbohydrate.

A random sample was made of the patients who had received instructions in 1953 in the diets using approximate measures; those receiving reduction diets with special features were excluded. There were 102 patients in this group. The diets ranged in calories from 800 to 1,500. The "800-calorie" diet contained 67 gm. of protein, 24 gm. of fat and 76 gm. of carbohydrate, providing a total of 788 calories. The "1,000-calorie" diet contained 71 gm. of protein, 39 gm. of fat, 97 gm. of carbohydrate and 1,023 calories. The "1,200-calorie" diet contained 71 gm. of protein, 53 gm. of fat, 112 gm. of carbohydrate and 1,209 calories. The "1,500-calorie" diet contained 73 gm. of protein, 76 gm. of fat, 132 gm. of carbohydrate and 1,504 calories.

None of these patients had been told that they

would be contacted at a future date and questioned about their weight; such action had not been contemplated at the time they were receiving dietary instructions.

Contact of Selected Patients

Since most of the patients were not local residents, it was not feasible to examine them personally. Therefore, questionnaires were mailed to all persons. The response was poor, about 25 per cent of each group returning them. Those patients failing to respond received a second questionnaire two months later, and a third attempt was made after another lapse of two months. After the third questionnaire had been sent, we had replies from forty-nine of the 103 patients in the group using weighed reduction diets and fifty-six of the 102 patients using approximate-measure diets. This constituted about a 50 per cent response for each group.

Characteristics of Patients

Of the forty-nine patients instructed in the weighed diet, seven were male and forty-two were female. Of the fifty-six patients instructed in the approximate-measure diet, twenty-three were male and thirty-three were female. The ages in the former group ranged from fifteen to seventy-six years, with thirty of the patients in the range of forty to sixty years. The patients using approximate-measure diets ranged from twenty to eighty years of age, with thirty-one in the range of forty to sixty years. Thirty-six of the weighed-diet group and forty-six of those using approximate-measure diets were married.

Nine of the patients using weighed reduction diets and ten of those using approximate-measure diets had a diagnosis of possible psychologic problems at the time of their medical examination.

The ideal weight for each person was determined and recorded by the physician at the time of his examination. The ideal weight was calculated from either the Metropolitan Ideal Weight Tables or the Medico-Actuarial Mortality Investigation Tables of 1912.

Initial Overweight.—The patients taught the weighed diet were much more overweight than were those taught the approximate-measure diet. Initially, the former patients were twenty-six to 202 pounds above ideal weight, with an average of eighty-two pounds. This was 17 to 155 per cent above ideal weight, with an average of 57 per cent.

The patients using the approximate-measure diet were initially six to 132 pounds above ideal weight, with an average of thirty-five pounds. This was 4 to 102 per cent above ideal weight, with an average of 25 per cent.

Results

Least Weight.—At the time when they weighed the least, the patients using the weighed diet ranged from thirteen pounds below ideal weight to 103 pounds above, with a mean of forty-one pounds above ideal. This range was from —8 to +81 per cent, with a mean of 29 per cent above ideal weight.

The patients using the approximate-measure diet had an average least weight that was seventeen pounds above ideal weight, with a range of eight pounds below and seventy pounds above ideal. This range was —5 to +58 per cent, with a mean of 12 per cent above ideal weight.

Present Weight.—At their present weights (1955), the patients who had been taught the weighed diet averaged fifty-eight pounds above ideal weight, with a range of seven pounds below to 160 pounds above ideal. This was —5 to +114 per cent above ideal weight, with an average of 41 per cent above ideal.

The patients using the approximate-measure diet averaged twenty-four pounds above ideal weight, with a range of three pounds below to eighty pounds above ideal. The average was 17 per cent above ideal weight, with a range of —2 to +67 per cent above ideal.

Time Required to Attain Least Weight.—The patients were asked the date at which they weighed the least. Approximately half of them failed to give this date; of those who did, nearly one third in each group attained their least weight within 6 months from the time they received their diet instructions. The others reached their least weight six months to two years after they had received instructions.

Vitamin Supplements.—All patients instructed in a reduction diet were given routinely a vitamin supplement that conformed to the hexavitamin capsule of the Pharmacopeia of the United States. Those on the weighed reduction diet and the 800-calorie approximate-measure diet were

advised to take one capsule daily; all others were advised to take one capsule every other day. It was thought at one time that excessive eating by some persons might be explained by an unconscious effort to secure adequate vitamins.[4] Approximately 90 per cent of the patients in each group reported that they had taken the prescribed vitamin supplement.

Medications.—The patients were not advised to take medications designed to control the appetite or to increase metabolism. When asked if they had taken such medications, an insignificant number in either group indicated that they had done so. Only three patients in the group using weighed diets and one of those using the approximate-measure diets took thyroid. One patient using the weighed diet took medication designed to control the appetite.

Effect of Diet.—The patients were asked if they noticed any special effect of the diet. Thirteen of those using weighed diets and fourteen in the approximate-measure group had no comment. Ten patients using weighed diets reported "no effect," nine stated they felt better and two reported feeling hungry. Eleven patients using approximate-measure diets reported "no effect," seven felt better and three felt hungry.

Comment

As already noted, the response to the questionnaire regarding loss of weight was poor, only 50 per cent of the patients responding. We think that a larger percentage might have responded if the patients had been told at the time they had instructions in diet that they would be receiving such a questionnaire. We have no means of determining the reason for failure of response by half the patients. Those who did not respond were no more overweight initially than were those who did reply. They may have failed to reply because of poor performance and failure to lose weight. However, some of those who replied had failed to lose weight and some indicated a gain in weight.

More female patients than male were taught the weighed reduction diet, about 80 per cent of this group being female. This preponderance of the female sex has been observed by others working with obese patients.[8-12] The proportion of men to women in the group using the approximate-measure diet was more even, 41 per cent being men and 59 per cent women. Perhaps fewer men were included in the weighed-diet group because they often are obliged to eat one or more meals away from home, making it impractical for them to follow a weighed diet.

More than half of the patients in each group were in the age range of forty to sixty years. This is to be expected, since many people have a tendency to gain weight after reaching middle age.

This study may have included two different population groups, as the patients who were taught the weighed reduction diet were considerably more overweight initially than were those taught the approximate-measure diet. However, the former group showed a greater loss of weight than did the latter. At the time of least weight, the former group had lost an average of 41 pounds as compared to an average loss of 18 pounds for those using the approximate-measure diet.

At the time of completion of this study, the patients taught the weighed diet showed a slightly better performance than did those using the approximate-measure diet. The former group had lost an average of 24 pounds as compared to an average loss of eleven pounds for the patients taught the approximate-measure diet.

Those patients using the weighed diet who regained weight regained an average of 17 pounds, whereas those using the approximate-measure diet showed an average regain of 7 pounds. With a longer lapse of time, it is possible that even more weight might be regained by both groups.

The ultimate goal in a program of weight reduction is to have the obese person reach his ideal weight. This may be expecting a great deal in some cases, but it is still the goal. Of the two groups in our study, fewer of the patients using weighed diets were within 10 per cent of ideal weight at the completion of the survey; five (10 per cent) of those in the weighed-diet group had achieved this loss, as compared with nineteen (34 per cent) of those using the approximate-measure diet.

As mentioned previously, nearly one third of the patients in each group who indicated the date at which they attained their least weight had attained such weight within six months after receiving diet instructions. This would indicate that a follow-up within six months after instruction might give the patient further incentive to continue the program of weight reduction.

Some investigators[13-15] consider that a reduction diet low in fats may be conducive to hunger. The reduction diets, with the exception of the 1,500-calorie diet, used by our patients may be classified as low in fat, but only two persons using the weighed diet and three using the approximate-measure diet reported feeling hungry.

Summary and Conclusions

A comparative study was made at the Mayo Clinic of questionnaire data regarding loss of weight received from forty-nine patients who had been taught to use a weighed reduction diet and from fifty-six patients who had been taught to use an approximate-measure reduction diet.

The patients using the weighed diet lost a greater number of pounds than did those using the approximate-measure diet. However, fewer of the patients using weighed diets attained weights within 10 per cent of their ideal weight than did those using the approximate-measure diet.

Whether a weighed reduction diet or an approximate-measure reduction diet is prescribed depends on the immediate objective with regard to the person concerned. If the objective is the loss of as great an amount of excess weight as possible without necessarily attaining ideal weight, the weighed reduction diet would be indicated. Otherwise, it is optional as to which of these two types of diet is prescribed. In view of the fact that more time must be spent with the patient to teach him the weighed reduction diet, it would appear more practical to use the approximate-measure reduction diet.

No matter what type of reduction diet may be used, follow-up of the patients at intervals of six months is advisable. Perhaps this would encourage them to continue reduction of weight until the ultimate goal of ideal weight has been reached.

Too few patients reported failure to take vitamin supplements to justify any conclusions about the possible effect such failure might have on the success or lack of success in reduction of weight. The few patients who did not take vitamin supplements were neither more nor less successful than were those who did take them. Similarly, no conclusions may be drawn as to the effect of medications designed to control the appetite or to increase metabolism.

Only two of the forty-nine patients using weighed diets and three of the fifty-six patients using approximate-measure diets reported they were hungry while following the diets.

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Case Presentation

Renal Artery Aneurysm Causing Malignant Hypertension

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PARTIAL obstruction of the renal artery blood flow to one kidney has been demonstrated experimentally to produce hypertension[1] and clinical cases secondary to unilateral renal artery disease have been described. However, only recently have the clinical symptoms and successful treatment of such cases been stressed. Certain clinical features may be easily misinterpreted if the correct diagnosis is not entertained; on the other hand, if the entity is suspected, diagnosis of unilateral renal artery disease may be made by established techniques, and relief of the hypertension frequently can be obtained by surgery.

The following case is reported to emphasize the possibility of hypertension resulting from unilateral renal artery disease and the misinterpretation of routine renal tests which may occur in such cases.

Case History

D. P., a forty-seven-year-old white woman, was first admitted to a private hospital on October 20, 1955, because of myomata of the uterus associated with menstrual irregularities and lower abdominal discomfort. Past history was normal except for a cholecystectomy in 1950. On admission the blood pressure was 138/80 mm. Hg. Urinalysis was normal with a specific gravity of 1.016. An electrocardiogram was normal. Abdominal hysterectomy and bilateral partial oophorectomy were performed without incident, but four days later the patient developed small bowel obstruction. At laparotomy a fibrous band was found and, when this had been severed, the obstruction was relieved. Her blood pressure prior to the second procedure was 136/70 mm. Hg. Postoperatively, she was given three units of whole blood within a week for episodes of hypotension. The lowest recorded blood pressure was 90/58 mm. Hg. The last blood pressure recorded during this admission was 130/90 mm. Hg., on November 4, 1955. The hospital course was otherwise complicated by a severe sore throat and pneumonia of the right mid-lung field, which cleared with antibiotics. She was discharged in the latter part of November, 1955.

Subsequently, she had a recurrent sore throat and increasingly severe, throbbing headaches which radiated from the occiput to the eyes. She also noted blurred vision and occasional nausea.

On January 27, 1956, the patient vomited after a severe headache, lost consciousness, fell, and lacerated her scalp. She was readmitted to the private hospital and shortly thereafter had a grand mal convulsion. The blood pressure was now 224/130 mm. Hg., the pulse rate was 96 per minute, and the temperature was 98.6°F. She was confused and disoriented. Severe papilledema and bilateral Babinski signs were noted. Neurologic examination was otherwise normal. Examination of the lungs, heart, and abdomen was not remarkable. The hemoglobin was 15.6 grams per cent. The initial white blood count was 23,000 per cu. mm. with 89 per cent neutrophils and 11 per cent lymphocytes, but was normal three days later. Urinalysis revealed 4+ albuminuria, 1-4 red cells and 3-5 pus cells per high power field. Specific gravity was 1.015. A lumbar puncture was done shortly after admission and the pressure was found to be 360 mm. of cerebrospinal fluid. The spinal fluid contained no cells, the protein was 20 mg. per cent, and the sugar was 37 mg. per cent. Culture was negative. Spinal fluid on two subsequent examinations was also normal. Blood urea nitrogen was 18 mg. per cent. Further examinations of the urine disclosed a 1-2+ albuminuria, occasional to 150 red cells per high power field, and specific gravities from 1.007 to 1.020.

Chest x-ray revealed the heart to be at the upper limits of normal in size. An excretory urogram on February third showed good concentration of dye bilaterally and was interpreted as normal. Skull x-rays were normal. A Regitine test was normal. The patient became more alert and was thought to have improved clinically although the headaches persisted and the blood pressure ranged from 200/120 to 240/140 mm. Hg. Papilledema was marked and showed no improvement.

Hypertensive encephalopathy was considered the most likely diagnosis; however, on February 10, 1956, she was transferred to the Neurology Service of Minneapolis General Hospital, since brain tumor had not been excluded and ventriculography had, therefore, been recommended.

The blood pressure on admission was 240/120 mm. Hg. The pulse rate was eighty per minute and regular.

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She was thin, well developed, and alert, with a height of 150 cm. and weight of 110 pounds. Funduscopic examination revealed indistinct disc margins, marked arteriolar narrowing and spasm with arterior-venous compression; flame-shaped hemorrhages were noted in the right fundus. Examination of the remainder of the head and neck revealed no abnormality. The thyroid was not enlarged. The lungs were clear. The heart was enlarged, its apical impulse was felt at the anterior axillary line in the left fifth interspace. A grade II systolic murmur was heard at the apex and at the aortic area. The remainder of the examination, including the neurologic study, was normal. Toe signs were absent.

A serologic test for syphilis was negative. The hemoglobin and white blood cell counts were normal. Several urinalyses revealed albumin varying from a trace to 1+, red blood cells from 1 to 200, and leukocytes from 2-4 per high power field. The maximum specific gravity was 1.024. Blood urea nitrogen was 8 mg. per cent. Spinal fluid pressure was 410 mm. of cerebrospinal fluid and the fluid was normal. Electrocardiogram now showed flat to inverted T waves in 1, AVL, V1 through V6 with depression of the ST segment in V6. Intramuscular and intravenous Regitine tests were normal.

The fluid intake was 1200 cc. to 3500 cc. and the urine output 500 to over 1000 cc. daily. The hospital course was characterized by increasing signs of cerebral irritation and severe hypertension despite anti-hypertensive drugs.

On the sixth hospital day ventriculography was done, but no abnormality of the ventricular system was noted. Following this, the patient became intermittently lethargic. She developed mild nuchal rigidity and another lumbar puncture now revealed grossly bloody fluid. Her course was afebrile. A lumbar puncture and cisternal puncture gave temporary improvement in consciousness but she finally lapsed into coma and developed Babinski signs. Cheyne-Stokes respirations were followed by cessation of breathing, but the patient was maintained for an additional seven hours in a Monahan respirator. She expired on the tenth hospital day.

Autopsy

Autopsy was performed eleven hours after death and no gross abnormalities of the lungs, liver, gallbladder, spleen, gastrointestinal tract, pancreas, adrenals, organs of the neck or muculoskeletal system were noted.

The heart showed moderate left ventricular hypertrophy, weighing 335 grams with the left ventricle measuring 16 mm. in thickness at the base. No abnormalities of the valves, coronary arteries, or myocardium were noted.

The left kidney weighed 140 grams, the right 100 grams. The capsules of both kidneys stripped with ease revealing smooth external surfaces, but the right kidney showed a yellowish mottling. On section normal gross architecture was seen in both kidneys with the corticomedullary junction distinct throughout. The left renal cortex measured 8 mm. in thickness compared with 6 mm. for the right kidney. There was an irregular area af hyperemia in the middle of the right kidney. The kidney pelves, ureters, and urinary bladder were all normal. The left renal artery and vein were normal. Midway between the origins of the right renal artery and the renal pelvis a saccular aneurysm of this artery was found which measured approximately 1.5 x 1 x 1 cm. in size. This was filled with a partially organized, laminated clot and compressed the renal artery at the site of the aneurysm to a diameter of 3 mm. The uninvolved portion of this artery was somewhat smaller in diameter than was the left renal artery. The aorta showed moderate atherosclerosis but neither renal artery was involved.

There was moderate subarachnoid hemorrhage over the basilar portions of the brain and small traumatic hemorrhagic lacerations at the sites of ventriculography. Coronal sections revealed two small linear hemorrhages, one situated above the pyramidal tract medial to the olive on the right side. The second was on the left side 2 mm. from the midline and 4 mm. from the floor of the fourth ventricle near the middle of the reticular formation.

Microscopic examination of the organs showed hyaline arteriolosclerosis in the pancreas, spleen, liver, and meninges. This was in contrast to the kidneys where only minimal arteriolosclerosis was present on either side. Histologically, the left kidney was normal. The right kidney revealed diffuse tubular atrophy. (Figs. 1 and 2.) This was the side supplied by the affected artery and represents classically the histopathology produced by renal ischemia. The glomeruli bilaterally appeared normal.

Comment

In summary a normotensive, forty-six-year-old, white woman had a subtotal hysterectomy and partial oöphorectomy complicated by small bowel obstruction requiring a second operation. This was followed by the onset of severe hypertension producing encephalopathy and death three months later. Clinical investigation during the hypertensive period showed varying degrees of albuminuria, intermittent microscopic hematuria, good urinary concentration, negative Regitine tests, and a nor-

mal intravenous urogram. Ventriculography was performed to exclude brain tumor. Autopsy revealed a thrombosed aneurysm constricting the right renal artery.

The clinical diagnoses considered were acute glomerulonephritis, essential hypertension, brain tumor, pheochromocytoma, and unilateral renal disease. Unilateral renal disease seemed excluded by the normal intravenous urogram and the correct diagnosis was not established prior to the autopsy. The inconsistencies with the considered diagnoses of glomerulonephritis or of essential hypertension were not appreciated until review of the problem.

Discussion

Sporadic instances of obstructive lesions of the renal artery have been reported and the literature was extensively reviewed in 1944 by Yuile.[2] More recently, hypertension resulting from this condition has been emphasized by Poutasse[3] who reviewed the literature, discussed the pathology, and described the salient clinical and diagnostic features. He has also reported four additional patients, in three of whom the hypertensive vascular disease was relieved by nephrectomy.[4]

Yuile and Poutasse both point out that obstructive renal artery lesions may result from extrinsic compression or intrinsic arterial disease. The former, usually due to tumor or aortic aneurysm, is rare. Intrinsic arterial disease may result from thrombosis, developmental defects, embolus, arteriosclerotic plaques, syphilitic arteritis, or, as in the above described case, aneurysm of the renal artery.

A case of renal artery aneurysm causing unilateral renal ischemia and hypertension by obstruction of the renal artery was recently reported by Pastor et al.[5] In their case an intravenous urogram was normal, but the diagnosis of renal artery aneurysm was established by translumber aortography. Following nephrectomy the hypertension disappeared.

The histopathologic findings of experimental and clinical unilateral ischemia of the kidney have been described by Bell.[6] The ischemic kidney shows tubular atrophy. In three cases reported by Laforet[7] there was benign arteriolosclerosis and tubular atrophy in the affected kidney and necrotizing arteriolitis in the opposite kidney. In one of the cases hypertension had been present four months, in another it had been present three years, and in the third the duration of the hypertension was not known. In the case of Pastor et al, tubular atrophy was noted but arteriolar changes were not mentioned. Hypertension had been present at least three years. In one of Poutasse's cases, ischemic and normal renal tissue were present in the same kidney, ischemia being manifested by tubular atrophy. Arteriolosclerosis was only moderate.

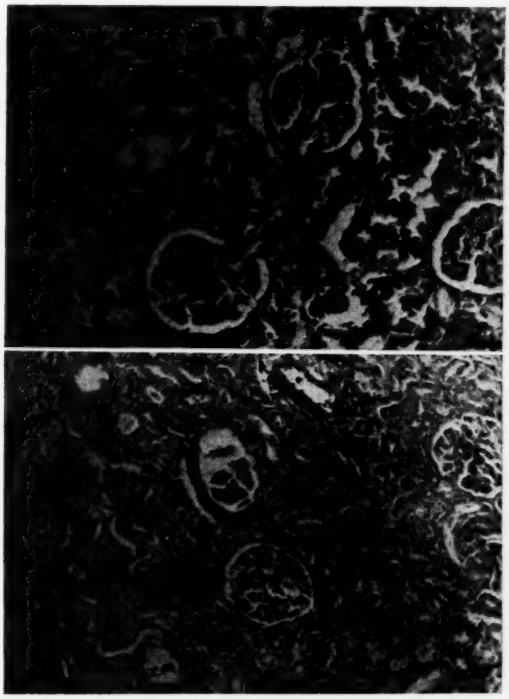

Fig. 1. *(Above)* Left kidney, normal. *(Below)* Right kidney, showing diffuse tubular atrophy.

Our case showed tubular atrophy in the ischemic kidney in marked contrast to the normal appearance of the unaffected kidney. Renal arteriolar lesions, however, were not remarkable in either kidney in spite of an accelerated course with death due to hypertensive encephalopathy. The renal artery aneurysm only partially obstructed the renal artery and no accessory or aberrant branches were found. It is to be emphasized that hypertension develops only when the renal blood supply is diminished. Complete infarction of a kidney does not produce prolonged high blood pressure.

It is interesting that in our case and in one of

the cases reported by Poutasse in which the main renal artery was thrombosed, the hypertension and presumably the thrombosis developed postoperatively. In both, this followed abdominal complications. The significance of this relationship is not known, but it is conjectured that the thromboses in these cases have been due in part to transient hypotension in abnormal renal arteries.

We believe that one of the most important points in the clinical study of this patient was the intravenous urogram which showed good excretion bilaterally and which appeared normal. That the intravenous urogram may be essentially normal or only minimally altered in spite of serious arterial obstruction has also been pointed out by Poutasse. When renal hypertension is suspected and intravenous urography is not remarkable, the comparison of urine samples from both kidneys by ureteral catheters may be an important clue. The involved kidney shows delayed excretion of indigo carmine and other dyes with reduced osmolarity of the urine. Translumber aortography should then be done to demonstrate the renal artery lesion. Surgery is the definitive treatment for this form of hypertension.

Summary

1. The clinical and pathologic findings in a patient with malignant hypertension due to unilateral renal ischemia from a thrombosed renal artery aneurysm are reported.

2. Correct diagnosis in this and some of the other reported cases was impeded by normal intravenous urograms. Other investigators have shown that antemortem diagnosis of this condition may be accomplished by comparison of urine samples from each kidney and translumber aortography.

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ASSESSING DRUG THERAPY IN PARKINSONISM

(Continued from Page 660)

Summary

A clinical method for assessing drug therapy in Parkinsonism has been devised. All drugs to be assessed in the treatment of Parkinsonism are delivered to the dispensary without ever having been seen by the doctor, who is to conduct the study. Here numbers are assigned to the drug and to a placebo. The key to the identity of the drugs is not disclosed until the final assessment is made at the end of a six-month period. One physician prescribes the numbered compounds to alternate patients, and he alone sees these patients during the period of study. A minimum of twenty cases is necessary for the study of a single new drug—ten receiving the placebo and ten the active compound. By this method, the objectivity of the examiner is assured. In addition, the effect of the new drug can be compared with that of the placebo, as well as with the previous medications the patient has received.

The psychologic factors in assessing drug therapy in Parkinsonism are important. Three patients while receiving placebos achieved a good therapeutic effect for a period of one to four months.

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Continuation Studies

Acute Cholecystitis and Choledocholithiasis

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VARIOUS etiologic factors, mechanical, chemical and bacteriologic, may contribute to the production of acute cholecystitis. In most cases the mechanical factor—obstruction of the outlet of the gallbladder—is the precipitating mechanism. If the function of the gallbladder has been disturbed so that absorption is inhibited to the extent that the volume of secretion exceeds absorption, distention of the gallbladder will occur. If distention is rapid, acute cholecystitis will result, and if the blood flow to the organ is compromised sufficiently, areas of gangrene and perforation may develop.

Even though mechanical factors precipitate the acute cholecystitis, infection often supervenes, and as time passes the infectious component becomes more and more important.

Acute cholecystitis may occur during acute infectious diseases, such as typhoid fever. In such instances, the mechanical factor is probably unimportant.

The clinical picture is variable, the symptoms being usually more severe in cases in which the cystic duct is occluded. In obstructive acute cholecystitis the onset is often sudden and the pain may be severe. The pain may consist of a continuous ache or a colicky pain in the epigastrium or right hypochondrium, frequently with radiation to the right subscapular or interscapular region. It is often associated with nausea and vomiting. There is muscle spasm and tenderness in the right upper abdominal quadrant and the gallbladder is sometimes palpable. Chills and fever and an elevated leukocyte count may be present, and there may be slight jaundice.

Some of the conditions from which acute cholecystitis must be differentiated include perforated gastric or duodenal ulcer, intestinal obstruction, appendicitis, coronary heart disease, pancreatitis, hepatitis, renal or ureteral calculus, and mesenteric thrombosis.

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Most clinicians will agree that the rare case of purely infectious acute cholecystitis, such as seen in patients with typhoid fever, should be treated medically during the acute phase of the disease. But there is still no agreement concerning the best treatment of the ordinary acute obstructive cholecystitis. Some surgeons believe that it should be treated conservatively during the acute phase and that operation should be deferred until it may be performed during a quiescent stage. Others favor early operation whenever possible.

Surgeons who favor conservative therapy point out that very few cases of acute cholecystitis fail to subside under proper medical therapy. Delay also permits complete diagnostic studies and consequently less frequent diagnostic errors. It also permits elective operation when the patient is in the best possible condition.

Conservative therapy does not mean neglect. Active therapy is mandatory. In the case of acute cholecystitis, movement of the diaphragm, gallbladder and gastrointestinal tract are unfavorable influences. The withholding of food removes stimulation of gallbladder activity and the diaphragm is splinted reflexly. Even under a regimen of starvation, however, intestinal activity is required to propel the large volume of secretions which are poured into the upper portion of the alimentary canal. The employment of continuous suction applied to an inlying duodenal tube helps to overcome this influence.

Pain sometimes may be relieved by drugs which cause smooth muscle relaxation, such as amyl nitrite, but more often morphine or a similar drug will be required. Morphine and related drugs cause contraction of the smooth muscle of the gallbladder and sphincter of Oddi, and for that reason their use should be avoided if possible. General supportive measures are also employed.

Since infection may become important even in obstructive cholecystitis, antibiotics are usually employed. Antibiotics are excreted in the bile. They do not reach the gallbladder when the cystic duct is obstructed, but they are useful in

relation to some of the complications of acute cholecystitis, such as cholangitis and localized or generalized peritonitis.

After subsidence of the acute process, if the gallbladder contains stones, or if it has been so permanently injured that it does not become visible when cholecystography is done, cholecystectomy should be performed.

On the other hand, many surgeons recommend early operation for acute cholecystitis, and when positive diagnosis can be made, we favor this course if the patient can be operated upon within the first seventy-two hours of the disease. Morbidity is decreased by this procedure and complications may be avoided by early operation. Unfortunately, it is often difficult to judge clinically whether the pathologic process is progressing or subsiding, and perforation sometimes occurs with little or no warning. Furthermore, although perforation leads to development of a localized abscess in most instances, perforation into the free peritoneal cavity occurs in about one-fourth of the cases of rupture, and such a development is associated with a high mortality. Early operation eliminates this danger.

If the patient is seen late, however, the infectious component becomes more and more important and operation is accompanied by increased danger. Conservative therapy should be instituted in such cases, and operation should be deferred until the acute process has subsided. There is no sharp dividing line between the time when early operation is better and the time when conservative measures are preferable. A practical working rule is to operate during the first seventy-two hours of the acute disease and to defer operation if the patient cannot be operated upon during that time limit. An exception to this rule is the case in which the process obviously progresses in spite of conservative therapy.

Whether operation be undertaken early or late, the procedure of choice is cholecystectomy, but in some cases a lesser procedure, such as cholecystostomy, is indicated. In any case, if the gallbladder is diseased, operation should not be deferred too long, since procrastination results in sharp increases in mortality rates. Mortality rates multiply quickly as the number of attacks of acute cholecystitis increases. Also in older patients the mortality from acute cholecystitis rises, and in patients over sixty years of age, it is five to ten times the mortality before that age.

In any consideration of this problem one should point out that early cholecystectomy in patients with chronic cholecystitis would minimize the problem of acute cholecystitis as well as the other complications of gallstone disease. Calculous cholecystitis, symptomatic or silent, is a potential hazard, and in the absence of definite contraindications, elective cholecystectomy should be done.

Since at least 10 per cent of patients with acute cholecystitis also have stones within the common duct, the surgeon must consider the indications for choledochostomy at the time of surgery.

There is no clinical picture which indicates positively in all cases whether or not common duct stones are present and decision as to the necessity for common duct exploration requires nice surgical judgment.

There are certain absolute indications for choledochotomy. These include:

1. The discovery by palpation of the duct of any suspicious lump suggesting stone.
2. Visualization of a filling defect suggestive of stone by operative cholangiography.
3. The presence of jaundice or the history of recent jaundice.
4. The presence of clinical cholangiitis.
5. An associated acute pancreatitis. In this case, decompression is accomplished by choledochostomy, but traumatic probing of the lower end of the bile duct must be avoided.

There are also several relative indications for choledochostomy, including: (1) The presence of dilatation of the bile duct or thickening of its wall; (2) The presence of small stones within the gallbladder, especially if the cystic duct is dilated; (3) The presence of a thick-walled, contracted gallbladder; (4) Alteration of the bile in the common duct (obtained by aspiration); and (5) Induration of the head of the pancreas.

If the common duct is opened it should be drained to the exterior postoperatively. Drainage should be continued until the following criteria for removal of the choledochostomy tube are fulfilled.

1. Cholangiographic evidence that the biliary tree is structurally normal, that no filling defects suggestive of stone are present and that the contrast medium empties readily into the duodenum.

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Current Concepts

Functional Heart Pain

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The accurate diagnosis of functional heart pain is of paramount importance. Serious organic heart disease and chest pain form such a frequent combination that it is essential to be able to assure nervous patients suffering from functional or harmless chest pain that there is indeed no evidence whatever that their pain is due to organic heart disease. Although an objective differentiation between the two is usually possible, either by the resting cardiogram or by comparison between the resting cardiogram and that taken after exercise, in a small number of cases this means of differential diagnosis is not reliable because organic heart disease can produce coronary pain in hypersensitive patients, the cardiogram remaining normal.

The chief characteristics of functional left chest pain are that it consists of two varieties. One is a heavy submammary fullness or ache, and the other is a sharp stab or prick. They may coexist or they may occur separately. These pains are nearly always felt in the left chest, in the fourth or fifth spaces, usually under the breast. They may be accompanied by the other symptoms of functional heart disease described in the first of these editorials.

The most valuable distinction between functional pain and that of coronary disease is the relation to exercise. Angina of effort is, in any individual case, precipitated by a definite amount of exercise. For example, pain, in one individual, may come on after walking a block, in another after fifty yards, in a third after half a mile. When present it is so increased by further exercise that the patient is forced to stop—frequently to look into a shop window—until the pain after a few minutes passes away. Thus the pain of angina of effort occurs during exertion not after it. Functional heart pain, on the other hand, does not prevent an individual from continuing with exercise already started. Although it is often loosely described as being precipitated by effort, it nearly always is noticed after such effort is finished. Its duration is much longer than that of angina of effort. It may be present for hours or days at a time. A further point of differentiation is the fact that hyperaesthesia of the chest wall is commonly associated with it. This may be general, or localized to one or more spots. It may prevent the patient from sleeping on the left side, or from carrying hard objects in a left breast pocket.

Functional chest pain is most common when the patient is tired or worried. In rare instances the sharp stab or prick is the predominant symptom, and a few cases are on record in whom this sudden stab of pain is immediatedly followed by a fainting attack. The type of individual who is apt to get functional heart pain is the hypersensitive, nervous type, not necessarily suffering from any definite psychiatric disorder. The pain, however, to some extent can be regarded as psychosomatic.

ACUTE CHOLECYSTITIS

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2. Direct evidence that the sphincter resistance is normal (12 to 17 cm. of water) and that the sphincter is not irritable.

3. Subjective comfort of the patient and lack of drainage around the tube when the drain is clamped.

Conclusion

Acute cholecystitis is a serious disease and constitutes an important cause of death. The incidence of acute cholecystitis can be decreased by earlier operation for chronic gallbladder disease. There is controversy concerning the best treatment of acute cholecystitis, and certainly selection of the proper treatment should be based upon the individual circumstances in each case.

This is the third in a series of articles by Dr. Bourne on heart disease.

Seminar

Reactions to Penicillin

II. The Incidence of Mild Reactions to Procaine Penicillin G in Aqueous Suspension

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THE preparation of penicillin used most frequently for intramuscular administration at this time is the aqueous suspension of procaine penicillin G. Preliminary experience with this agent in 1948 gave indications that it might prove relatively more toxic than the preparation in sesame oil then in common use.[1] Furthermore, Part I of this study revealed that use of the aqueous suspension accounted for more than half of the seventy-four fatal and 176 nonfatal *severe* reactions to penicillin reported in the literature through June, 1954. Therefore, we sought to compare the incidence of *mild* reactions after administration of the sesame-oil agent, as reported in 1948, with the incidence after administration of the same preparation in aqueous suspension in common use during 1952 and 1953 at the Mayo Clinic. The literature concerning mild reactions to penicillin has been reviewed briefly.

Method and Materials

A review was made of the records of 385 patients who received intramuscular injections of procaine penicillin G in aqueous suspension at the Mayo Clinic in 1952 and 1953. The amount of penicillin administered at each injection varied from 300,000 to 1,000,000 units. All of these patients had either nasal or sinus disease and the majority received penicillin prophylactically prior to operation. No other antibiotic was given to this group. None of these patients were known to be sensitive to penicillin prior to the administration of the antibiotic agent at the clinic.

Results

Only four reactions to penicillin were observed in this group of 385 patients. These reactions were all of the mild cutaneous type and all patients recovered rapidly. Data concerning these 385 patients are presented in Table I. Attention is called to the fact that follow-up observations were not made in forty-nine of these patients. It will be noted also that 16.1 per cent of the patients gave histories of asthma, but none of them were known to have experienced a previous re-

TABLE I. DATA CONCERNING 385 PATIENTS RECEIVING PROCAINE PENICILLIN G IN AQUEOUS SUSPENSION

Data		1952	1953	Total	Per Cent
History of asthma		36	27	63	16
Sex	Male	125	97	222	58
	Female	87	76	163	42
History of reaction to penicillin		0	0	0	0
Follow-up after last injection, days	None	26	23	49	
	Less than 8	74	90	164	55
	8-14	32	20	52	
	More than 14	80	40	120	45
Age, years	0-9	11	6	17	4
	10-19	14	9	23	6
	20-29	31	14	45	12
	30-39	53	36	89	23
	40-49	41	40	81	21
	50-59	41	39	80	21
	60-69	19	27	46	12
	70+	2	2	4	1

TABLE II. NUMBER OF INJECTIONS PER PATIENT COMPARED WITH NUMBER OF REACTIONS

Intramuscular Injections*	Patients	Per Cent	Reactions
1	58	15.1	1
2	73	19.0	0
3	144	37.4	2
4	55	14.3	0
5	22	5.7	0
6	13	3.4	1
7	7	1.8	0
8	4	1.0	0
9	2	0.5	0
10+	7	1.8	0
Total	385	100.0	4

*Median number of injections = 3.

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The Mayo Foundation, Rochester, Minnesota, is a part of the Graduate School of the University of Minnesota.

TABLE III. INCIDENCE OF REACTIONS TO AQUEOUS PROCAINE PENICILLIN G

Year	Patients	Injections	Reactions		
			Number	Rate by Injections, per cent	Rate by Patients, per cent
1952	212	630	2	0.32	0.94
1953	173	599	2	0.33	1.2
Total	385	1,229	4	0.33	1.0

TABLE IV. COMPARISON OF INCIDENCE OF REACTIONS TO PENICILLIN

Type of Procaine Penicillin Given Intramuscularly	Patients	Reactions	
		Number	Incidence, per cent
Sesame oil (1948)	400	3	0.75
Aqueous (1952-1953)	385	4	1.0
Total	785	7	0.89

TABLE V. REPORTED INCIDENCE OF MILD REACTIONS TO PENICILLIN

Author	Incidence of Reactions, per cent	Route of Administration	Year	Cases	Preparation
Collins-Williams and Vincent[2]	0.6-8.0	Multiple	1953	600	Penicillin, type unknown
Anderson and Keefer[3]	6.0*	Multiple	1945	10,420	Amorphous penicillin
Kuh and Collen[4]	5.1*	Oral	1949	322	Oral penicillin
Kitchen and associates[5]	4.65	Intramuscular	1947	903	Penicillin, type unknown
	3.38	Intramuscular	1950	236	Penicillin, type unknown
Stollerman and Rusoff[6]	2.8	Intramuscular	1952	143	Benzathine penicillin G
Lepper and associates[7]	2.7	Intramuscular	1949	557	Crystalline penicillin in oil and beeswax
	1.4	Intramuscular	1949	148	Procaine penicillin in oil
	1.2	Intramuscular	1949	598	Aqueous crystalline penicillin
Wellman and Herrell[1]	0.75	Intramuscular	1948	400	Procaine penicillin in sesame oil
Bernstein and associates[8]	0.6	Oral	1953	5,500	Oral penicillin
	0.2	Oral	1953	19,000	Oral penicillin
Simon[9]	0.2	Intramuscular	1952	1,237	Crystalline penicillin with tripelennamine

*Adjusted incidence of reactions.

action to penicillin. Table II compares the number of reactions to penicillin with the number of intramuscular injections of the drug given to each patient. As shown in Table III, the incidence of reactions after the intramuscular administration of procaine penicillin G in aqueous suspension was 1 per cent. That this incidence of reactions compares favorably with the incidence of 0.75 per cent reported in 1948 after use of procaine penicillin suspended in sesame oil is clear from the data presented in Table IV. This table further demonstrates that a total of 785 patients observed in these two studies received penicillin suspended in one of the afore-mentioned vehicles, with an over-all incidence of reaction of 0.89 per cent.

Comments

Table V summarizes a brief review of the literature concerning the incidence of mild reactions to penicillin. Wide variation is noted in the reported incidence of these mild reactions. It is difficult to determine what causes this wide variation; it may be due to the fact that certain variables that may influence the incidence of reactions are not always reported. Some of these factors include the type of penicillin administered, the route of administration, the patient's previous experience with penicillin, the period of observation, the patient's allergic status and the definition of a reaction to penicillin.

As noted in Table I, forty-nine of the 385 patients in this study did not continue under observation after receiving penicillin. Therefore, the incidence of reactions to penicillin in this study would increase from 1 to 1.2 per cent when these patients are removed from the total. In concluding that the incidence of mild reactions to the aqueous suspension was about the same as reported in 1948 for the sesame-oil preparation, we have assumed that the two studies also have about the same characteristics as are detailed in Tables I and II.

It is frequently stated that reactions to penicillin are more likely to occur in patients who give an allergic history than they are in nonallergic patients. As previously noted, none of the patients in this study gave a history of previous reactions to penicillin, whereas 16.1 per cent gave histories of asthma. It is interesting that none of the latter group experienced a reaction.

Summary

Four mild cutaneous reactions occurred in a group of 385 patients receiving intramuscular injections of procaine penicillin G in aqueous suspension at the Mayo Clinic in 1952 and 1953. This incidence of 1 per cent compares favorably with an incidence of 0.75 per cent reported in 1948 after administration of the same agent sus-

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Tumor Conference

Section Editor
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The patient (P. O.) is a young woman of thirty-one who noted a mass in the upper outer quadrant of the right breast during her sixth month of pregnancy. The patient has four children. A biopsy of the breast was performed without frozen section facilities being available, and the paraffin section histologic diagnosis was scirrhous carcinoma of the breast. The patient received a radical mastectomy immediately upon admission to St. Barnabas Hospital.

Microscopic examination of the tissue removed at surgery revealed a highly undifferentiated adenocarcinoma residual in the neighborhood of the previous biopsy, but no metastases to lymph nodes removed with the specimen. The patient's postoperative course was uneventful and advice was sought from the Tumor Conference regarding further management of the patient's problem.

The members of the Conference agreed unanimously that the pregnancy should not be interrupted. However, in view of the increased mortality from breast cancer appearing concomitantly with pregnancy, it was decided to empirically use roentgen therapy to the thoracic wall and the supraclavicular area, and to follow the birth of the child with surgical oöphorectomy.

The fact that breast cancer appearing during pregnancy carries an increased risk to the patient has been recognized for many years. However, a recent publication by Dr. Thomas White of Seattle in 1955 reviewed the world literature on this problem and presented the results of 1,413 cases. It was shown that only 2.8 per cent of all breast cancers are associated with pregnancy. For every 10,000 pregnancies we can expect to find concomitant carcinomas of the breast in three instances.

In this study the survival rates were computed according to the first, second, or third trimester and also for the period of lactation following delivery. The results are as follows: for the first trimester the five-year survival rate is 16.3 per cent, for the second trimester the five-year survival rate is 8 per cent, for the third trimester the five-year survival rate is 9.7 per cent, and for the period of lactation the five-year survival rate is 16.1 per cent. The ten-year survival rate for all of these periods varies but slightly from 5.6 per cent to 7.5 per cent. In the over-all cases reviewed the five-year survival rate was 13.8 per cent and the ten-year survival rate was 8.5 per cent. When lymph node metastases were considered, those patients without nodal metastases at the time of surgery had a 21.5 per cent chance of five-year cure and an 18 per cent chance of ten-year cure.

We have never been able to demonstrate that the emptying of the uterus, particularly in the second or third trimester, improved the chances of the pregnant female with breast cancer. Certainly there is no justification for adopting a completely pessimistic view with regard to breast cancer appearing concomitantly with pregnancy, and we must provide the best therapy possible for our patients under these circumstances. The use of oöphorectomy to prophylactically institute hormonal therapy can be questioned. However, since we know that there is an increased chance of lighting up occult metastases with subsequent pregnancies, and since there is some rationale for the removal of estrogen-producing organs of the body if occult metastases are present, oöphorectomy may well be beneficial in this case.

REACTIONS TO PENICILLIN

(Continued from Page 679)

pended in sesame oil. A brief review of the literature regarding the reported incidence of mild reactions to penicillin has been presented.

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Editorials

JOHN F. BRIGGS, M.D.
ARTHUR H. WELLS, M.D.
HENRY G. MOEHRING, M.D.

THE PSYCHIATRIC SOCIAL WORKER IN PSYCHOSOMATIC MEDICINE

Physicians frequently refer patients having somatic symptoms with emotional involvement to the psychiatric clinic. These patients are usually having difficulty in managing their problems in daily living, although in some instances the underlying emotional distress has been obscured through the patients' concern over their physical health. In a broad sense, the goal of therapy will be to help them identify and learn to cope with the problems which interfere most with their total functioning. The methods of approach in therapy will vary greatly with the individual patient, and we feel the situations of these persons presenting psychosomatic difficulties call for flexible, imaginative use of our professional skills.

The clinical setting, where several professions collaborate in the interests of the patient, is conducive to such flexibility. Each of the several members of the psychiatric clinical team, most frequently consisting of the psychiatrist, the psychologist, and the psychiatric social worker, brings from his particular experience and training an emphasis needed for the understanding of both the personality and the situation of the patient. The need to assess the effects of the environment upon the patient is as important as the understanding of his personality. As we come to know the patients better through the professional relationship, we see their emotional conflicts of earlier origin are being reactivated with certain kinds of experiences or conditions in their current life.

Knowledge of personality dynamics is essential for all team members. The psychiatrist, as the team leader, coordinates the clinical findings of the others in the processes of diagnosis and treatment. It has often been assumed that certain patients with somatic symptoms in which emotional conflict plays a role, would require treatment directly through him. Such a plan is feasible for certain patients, but not for others. The practice of intensive psychotherapy, which would aim to reveal to the patient the nature and source of his conflict, is most often the special area of the psychiatrist. There is wide variation, however, in the capacity of individuals to utilize or profit from intensive therapy.

Frequently, these patients benefit from the approach of a psychiatric social worker who is trained in the techniques of "case work," which, in a clinic setting, is a kind of psychiatrically-socially oriented therapy. His focus is on the interaction of the patient and his environment, with which he becomes acquainted in various ways, perhaps through contact with the patient or his family, or both; or through agencies or other persons concerned with the family. The psychiatric social worker may, if working directly with the patient, help him to take certain steps to alter his situation, without engaging the patient as extensively as the psychiatrist would about the intrapsychic aspects of his problems. As in all therapy, the patient's desire for change and the development of a sound therapeutic relationship are basic in the achievement of the social work goals. Greater attention may be given to the incentives which are present or lacking in the patient's environment.

More purely psychiatrically oriented therapy aims to reach the patient on a different level; to focus more extensively with him upon his emotional reactions; to help him connect his current difficulties with his past. Needless to say, psychiatrists do not deal exclusively with the intrapsychic life of the patients; nor do psychiatric social workers restrict their attention to the influences and pressures exerted upon the patient from the outside. There are, in general, some differences in emphasis on the part of the various members of the clinical team. Our goals and methods in treatment of the individual patient have some differences, but also similarities. Each of the several professions makes a distinct contribution to clinical diagnosis.

(MRS.) PHILIPPA H. EGGLESTON
Psychiatric Social Worker

WHAT DOES "BLUE SHIELD" MEAN TO YOU?

Have you ever stopped to ask yourself why some 37 million Americans have enrolled in Blue Shield, the medical profession's prepayment program, in a little more than ten years' time?

Blue Shield and its companion, Blue Cross, have accomplished the most stupendous enrollment any prepayment medical care program ever offered the American people—at a minimum of expense and by relatively "low pressure" sales methods. This accomplishment has been possible because there is now an almost universal desire for protection against the costs of unpredictable illness. The chief reason why so many people have chosen Blue Shield is that they know it is recommended and supported by the medical profession, and most people have confidence in the nation's doctors.

By the same token, more Americans have chosen Blue Cross than any other hospital insurance program because Blue Cross is sponsored by the hospitals, and the public believes in the integrity and efficiency of our voluntary hospital system.

Doctors and hospitals have created for themselves an immeasurable storehouse of good will in these Plans. But the preservation of this great asset depends upon eternal vigilance on the part of physicians and hospitals.

When the doctor speaks well of Blue Shield, when he renders the best service he is capable of rendering to Blue Shield patients, when he tries to conserve the resources of Blue Shield against extravagance or abuse, when he conscientiously fulfills his voluntarily accepted obligation as a participating physician, then he is helping to preserve and increase this asset. He is helping to make ever more formidable the shield that protects the freedom of medical practice.

Blue Shield is also a bridge of common interest and mutual benefit between the doctor and his patient—it is evidence to each of the trust and confidence of the other. Blue Shield is an assurance to the patient of prepaid service when he needs it—and to the doctor, it assures prompt reimbursement for his services.

PROFESSIONAL RELATIONS COMMITTEE
Blue Shield Commission
Chicago, Illinois

THE TRACINGS OF ARTERIAL AND VENOUS PULSATIONS

A Forgotten Technique

The tracings of the arterial and venous pulsations of the neck (sphygmography, phlebography) were recorded a long time ago. The data gathered through their study were so valuable that good progress was made with their help in the study of arrhythmias and in that of valvular defects.

The easy handling of an electrocardiograph by a trained technician and the undeniable superiority of electrocardiography over pulse tracings for the recognition of the various types of arrhythmias gradually led to the discarding of sphygmography and phlebography as routine methods of investigation. It should be kept in mind, however, that the discarding was also due to incompetence or laziness of physicians or to the need for examining in a cursory way too many clinical cases.

In spite of the existence of many other graphic methods, the study of the carotid and jugular pulsations is still extremely valuable for the diagnosis of aortic stenosis and for that of tricuspid insufficiency. Therefore, these techniques should be used routinely by medical residents whenever diagnostic problems concerning valvular lesions are raised. It is striking to note that, even in scientific presentations, at times the data of more complex and painful procedures (arterial catheterization) are presented when a single sphygmogram would have supplied the same information.

Modern technique renders sphygmography and phlebography extremely easy. The use of a crystal microphone with a "linear" response and of an electronic type of electrocardiograph permits easy detection and correct amplification of the waves. A "suction cup" is applied over the bulb of the right external jugular vein for recording the phlebogram and is automatically held in place without compression. A small funnel is applied over the right carotid or right subclavian arteries and is held by hand with firm compression; if long tracings are desired, a special neck holder can be employed.

Simultaneous recording of sphygmograms or phlebograms and heart sounds is made in order to interpret correctly the various waves. The writer found only one slight disadvantage in the use of crystal microphones for the study of pulses: the *v-wave* of the phlebogram is at times slightly delayed and may coincide with a third sound.

In conclusion, use of correct instrumentation, theoretical knowledge of the indications and possibilities of these methods, and one hour of training should enable any interested physician to gather important data which are of frequent use in this era of cardiac surgery.

A. A. LUISADA, M.D.

TV FACTS OF LIFE

The facts of life about advertising are common knowledge. Advertising boosts demand for a product to a point where increased volume lowers the unit price. Instead of adding to the price of an article, advertising actually lowers it.

Everything about advertising in general is particularly true about advertising on television. For television offers the most powerful advertising force in existence. TV shows a product, demonstrates it, and tells about it in thousands of homes simultaneously. And at a cost of a fraction of a cent per home.

With this power comes concurrently a sense of responsibility. Not every advertiser who comes to a television station is accepted. His product, the things he wants to say about it, and the way he wants to present these sales points come under the most careful inspection. Probably no other advertising media is as careful about its clients as is a reputable television station.

The reason for this careful scrutiny makes up the facts of life for the telecaster. He has a large investment in his business, and he wants to stay in public favor as long as possible. An unscrupulous promoter may figure to make a profit fast and move on. Not so the operator of the television station, who may be offered a fabulous proposition by the fly-by-night advertiser.

As in no other business, the television station owner knows his success depends upon trustworthiness, good will, and public confidence. TV is an invited guest in your home—and the TV salesman can be invited out of your living room as easily as you turn a little knob.

That's why the telecaster watches carefully over the length of a commercial message. He knows if it's too long, too insistent, or just plain irritating—"click" goes that little knob, and the audience is gone.

On the other hand, the man who's paying the bill to bring you some of the world's finest entertainment has a right to put his product before your eyes—to show you why it can make life more pleasant, your tasks easier, your home more comfortable. The challenge is in the balance, and the solution of that challenge is something of an art.

The millions of people who enjoy television daily find it hard to subscribe to the thought that TV advertising which helps people look better, smell better, feel better, and do everything from saving money to brushing teeth more regularly should be despised by every cultured American.

GENE GODT
WCCO Radio and TV

THE ETCHING PROCESS

In previous articles we have discussed the selection of copy and the making of negatives, both line negatives for zinc etchings and screen negatives for halftones. When these negatives were made, we learned that the next operation was printing them on metal, either copper or zinc.

The next step is to etch that metal to the required depth so as to have high areas, which are the printing areas, on the original surface of the plate that will carry the ink. It will have open spaces in between these high areas which do not print. It is evident that if the entire surface were a solid area or plane, we would have a resulting solid when printing. A halftone is made up of high points or dots with white areas in between. These dots vary in size—pin points in the highlight areas—a little larger size in the middle or gray tones—and a still larger dot in the solid or black portions. The metal is coated with an emulsion and these areas, we learned, which are exposed to light, become set or fixed and do not develop off the plate. Unexposed areas do and these are etched away with iron perchloride, if we are etching copper, and nitric acid, if we are etching zinc. The acid attacks these bare metal areas and etches down into the metal where there is no enamel or acid resist surface. To attain the same tone values as the original photo or copy, it is sometimes necessary to reduce the size of some of the dots. This is done by re-etching these local areas by hand. The engraver first protects the areas that had been etched to the proper tone value by painting them with an asphalt solution, then reduces the size of the dots in the remaining areas by painting on an etching solution. This he wipes off and washes out of the plates after the proper size dot has been obtained.

In etching zinc, because of large open areas between lines in many cases, it is necessary to etch into the metal deeply in these open areas so that they do not pick up ink when printing.

This is the third in a series of editorials on the subject of photo engraving.

This is done by building a bank of powder along the sides of the lines being held so that we do not etch under them, yet get depth in the areas. This is called powdering. When the proper depth and size of dots has been obtained, in the opinion of the etcher, the plate is ready for finishing and mounting. Mounting commonly means nailing or cementing the etched metal plates to a wood block which, together with the metal plate, is type high. This is done so that the face of the plate is nearly the same height as the type, for, as you know, type and etching or halftone are all locked together in a form in printing and must be of the same height so that both type and plate will receive a uniform amount of ink. Where there is a slight variation, it is possible to compensate for it in make ready by underlaying the block in selected areas with paper of the required thickness.

In mounting the plate other operations are performed, such as squaring up the plate, cutting in mortises for type and beveling. When the plate has been squared up and mounted, it is passed on to the finisher who examines it for imperfections, such as dots with imperfect shape, or closed areas between the dots, burrs on the edge of the plate and other necessary operations such as outlining, cleaning up, lettering, or burnishing down some areas to get a heavier tone.

After the finisher has completed the work to his satisfaction, the plate is ready for proofing. If the plate is a one color zinc or halftone, it is proofed on a one color press. If it is part of a more than one color job, it is desirable to proof it on a two or four color press. The proof should be run on the same paper the printed piece will be run on, for best results. The inks used in proofing should be the same as used when the work is printed and in the same sequence that will be followed when printing. If the job is to be run wet, it is advisable to proof it wet so that the press room practice is followed as closely as possible. This is the only way you can be sure the printed job will match the proofs. When the proof has been pulled or run it is examined carefully by the foreman and proofer for imperfections and when they are satisfied that it faithfully reproduces the original copy it is ready for submission. The simple outline I have given you is the procedure followed in making photo-engravings in black and white or color.

Reproducing colored art or kodachromes involves additional operations and equipment. The procedure, however, is basically the same as described for black and white. Because a résumé of this would involve more time and space than is allotted, it will be discussed at a later time.

W. W. CHREIMAN

THE HISTORY OF GLASS CONTAINERS

The production process in today's modern glass container plants begins with the delivery of the raw materials. All glassmaking starts with three basic ingredients: Sand (largely silica), soda ash (sodium carbonate), limestone. Cullet, which is crushed glass, is added to hasten melting and to make the batch more workable. Several other materials are used, but quantities are extremely small in relation to the three basics. However, each of these minor ingredients contributes important properties to the finished glass container.

Raw materials are weighed on automatic scales and mixed in giant hoppers. Buckets, suspended from overhead rails, carry the batch to the continuous automatic batch feeder which introduces it into the furnace or "tank" where molten glass bubbles at temperatures of more than 2700 degrees F. These white-hot infernos must be kept in operation twenty-four hours a day, seven days a week, and furnaces literally burn themselves out in about two years and must be rebuilt.

From the melting end of the tank the molten glass progresses through a submerged throat into the refining chamber, where it is purified before passing to the forming machines.

In one type of operation, the molten "metal" (as the glass blower calls it) then flows into a huge, revolving bowl made of heat-resistant material. From there it is sucked up into the hungry molds of a rapidly rotating forming machine.

In another method, the tank is mounted on a raised platform, above the forming machines, where the molten glass flows into mechanical feeders, which in turn exude red-hot gobs of a taffy consistency. Cut free, a gob of molten glass drops with the speed of a falling star into a waiting mold which presses it into a rough approximation of the finished bottle. As this mold releases the embryo, a finishing mold closes and captures it. In split seconds, compressed air blows the glass container into final shape. The mold's iron

This is the sixth in a series of editorials on the subject of glass and glass containers.

jaws swing open, and out comes a jar or bottle—every container uniform in size and shape.

To leave just the right temper in the glass for strength, finished containers are passed through an annealing lehr or cooling oven. In an endless parade on a moving belt, bottles and jars pass through these long, tunnel-like ovens. Heat which at first is approximately 1,000 degrees is gradually reduced to room temperature. At the end, containers are carefully inspected before packing. One minute flaw, all but invisible to the untrained eye, and the container is broken into cullet and returned to the beginning of the production line.

Some four thousand years ago, the first glass containers were priceless luxuries. Today, the literally billions of clear, amber, blue, green and opal jars and bottles used to package a long list of food products, beverages, drugs and cosmetics, and household products are necessities. Time-tested, they are the most versatile and indispensable form of packaging ever devised. Sanitary, durable and easily handled, they add nothing to or take nothing from, any product packed in them, and their contribution to the health, welfare and comfort of mankind during the last four thousand years is inestimable.

JOHN M. FOSTER
Foster-Forbes Glass Company

REHABILITATION IN PULMONARY TUBERCULOSIS

Although interest in the true rehabilitation of the tuberculous in the United States goes back forty-five years to the idea of Dr. Hermann Biggs, very little has been done to implement his idea in his own country. The Altro Workshops remained almost static until after World War II, when extensions to the shops and to the trades were made. Only sputum-negative cases are admitted and the majority of the workers have had disease of only limited extent. Yet excellent results have been maintained, for not only has steady and permanent employment in first class conditions been provided in the shops, but many beneficiaries have been helped by the managing committee to work in open industry in many spheres, usually with far better economic status than they enjoyed before the discovery of their disease. No comparable sheltered workshop was established before 1939.

The Potts Memorial has unfortunately had to close down for lack of support. This is indeed a tragedy even greater than the disappearance of the village at Saranac Lake, because the latter catered in the main for those who could afford its amenities in housing, and was less interested in employment. Dr. Pattison presided at the Potts Memorial services which approximated most nearly in the United States to those of Papworth and Enham-Alamein in England. It must have been hard for him to shut down at the very time of renewed interest; it is difficult to understand why he was not supported under some section of the new measure promulgated by President Eisenhower in 1954.

In the last two years, great strides have been made throughout New York State. Under the driving force of its executive secretary, Mr. Robert Osborn, the State Aid Charities Association has established the voluntary machinery for connecting sanatorium treatment with job-placement. Education officers, occupational therapists and vocational training officers work together at hospitals, and link up with field consultants and patient services committees in the counties, towards the training and placement of patients in work properly suited to their background, their mental and manual attainments, and their functional ability. Voluntary committees are encouraged to set up sheltered workshops such as that at Binghampton. In this magnificent workshop, sputum-negative cases mix with sufferers from cardiac and orthopedic disabilities in training and in remedial exercises towards the assessment of their optimum work-potential, and can remain, on a nonresidential basis, until they are placed in local business organizations. Its committee, under the generous and understanding leadership of Mrs. Storer, is now considering housing for such beneficiaries as are unlikely to become fit for open industry. Such ventures supplement the excellent work done in state rehabilitation hospitals like that at Haverstraw, which has equipment for remedial exercises and occupational therapy that arouse envy in the British visitor.

The 1910 pronouncement of Hermann Biggs has been reiterated in modern context by Sidney H. Dressler, in a recent article in the *American Review of Tuberculosis,* in the following words: "It is medically as well as economically and

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This is the fifth in a series of editorials on the subject of pulmonary tuberculosis.

sociologically essential to achieve complete rehabilitation as soon as possible in each patient who receives chemotherapy for pulmonary tuberculosis." He and his co-authors realize the present need in the United States. The 1954 report of the Minnesota Health and Tuberculosis Association stated that 110,000 new cases are reported each year. Some 45,000 of these join the ever growing total with resulting disability; only a very small minority can have access to services which are their due in their proper desire to re-establish themselves with self-support and self-respect. Herein lies a great opportunity for the practical application of the well-known generosity and humanitarianism of all Americans.

R. R. TRAIL, M.D.

THE BALLISTOCARDIOGRAM

A Question Mark

The ballistocardiogram (BCG) is a graphic representation of the motions imparted to the body by the movements of the heart, the ejection of blood, and the flow of blood through the arterial system. The movements of the body follow the Newtonian law stating that "to every action there must be an equal and opposite reaction." Therefore, impacts and recoils follow each other in the body.

Unfortunately, the vectors of force moving the body have different directions in various subjects and at every instant due to the different anatomic position of the heart within the chest, and other factors. Moreover, multiple elements connected with the structure, weight, and shape of the body, as well as with the elasticity and tonus of the vascular system change the amount of motion imparted to the body.

Most ballistocardiographs register only longitudinal (head-to-foot) motions. This motion represents only one part of the total force developed by the heart. It should be concluded that the forces which move the body in one direction are not proportional to the total of the forces causing this motion and that the degree of modification, which varies from subject to subject, is an *unknown variable.*

In spite of a large number of publications, the physiologic changes which cause or accompany the various waves of the BCG are still incompletely known, so that considerable debate is unavoidable. The confusion is increased by the fact that the waves traced by various apparatus occur at different times. Moreover, variations in vascular resistance (like those caused by drugs, reflexes, or exertion) may modify some of the waves.

The forces imparted to the body by the cardiac action cause vibrations in a range of between one and twenty cycles per second. Three different types of tracing have been recorded:

1. The *tracing of displacement* (stiff-springed Starr's bed, Dock's photoelectric method) records only the waves of lowest frequency.
2. The *tracing of velocity* (Dock's magnetic method) records mostly the waves of the zone of resonance of the body (3 to 5 cycles/min.).
3. The *tracing of acceleration* (free swinging table) records the waves in the range of 4 to 20 cycles/sec.

Recently studied devices record all three types of tracing from a single crossbar placed over the shins and connected with an electromagnetic system (Arbeit-Lindner, 1954) and it was stated that the acceleration tracing is the most reliable and clinically significant. However, the effects upon body motion of all supports and restraints produce marked alterations of the tracing, so that they are no longer true representations of the displacement, velocity, and acceleration of the body. Based on this criticism, a new device consisting of a lightweight, swinging bed and a magnetic arrangement recording the three types of BCG was described (Rappaport, 1955). Unfortunately, the new tracings are quite dissimilar from any of those previously described and the acceleration tracing resembles a low frequency tracing of the precordium.

Pending further studies, it is advisable to maintain an expectant attitude and to abstain from drawing precise clinical conclusions based on the BCG tracing.

In regard to the ballistocardiogram, one is still tempted to repeat a well-known phrase: "It is a mystery wrapped up in a puzzle inside an enigma."!

A. A. LUISADA, M.D.

CHEST SHADOWS IN THE AGING

Serious chest conditions particularly prevalent among older persons, such as primary malignancies and tuberculosis, usually pass through a silent stage of evolution when their presence can be detected only by their x-ray shadows. For this reason, chest shadows in the aging are particularly important, writes Dr. J. Arthur Myers, professor of medicine and chief of the Chest Clinic, University of Minnesota Medical School. Specific diagnoses cannot be made from x-ray shadows of lesions, but the shadows indicate the presence of disease, after which the etiology usually can be determined promptly by other phases of an examination.—J. A. MYERS, *Geriatrics*

President's Letter

DEPENDENT MEDICAL CARE

The new Military Dependents' Medical Care Act which was passed by Congress on June 5, sets up the financial machinery for furnishing private medical care to hundreds of thousands of wives and children of servicemen.

For the first time there will be medical care available at government expense for individuals who are not necessarily veterans themselves nor in low income brackets. The act provides medical care for spouses and children of all military personnel. This care may be given by civilian physicians in civilian hospitals when military facilities are not readily available or are filled to optimum capacity.

The law goes into effect December 8 and medical associations were requested to make all arrangements for local administration by October 8 to give the Department time to implement the law.

The Act was discussed at a summer meeting of various committees of the American Medical Association. The importance of an early decision on methods for handling the matter on the state level became obvious, so in August a special meeting of our Council was held as well as a special meeting of the North Central Medical Conference for the purpose of co-ordinating actions taken by the conference states (Minnesota, Wisconsin, North Dakota, South Dakota, Iowa and Nebraska).

At our Council meeting, it was decided that the Minnesota State Medical Association should act as the contracting and fiscal agency for this dependent medical care program in Minnesota and that the program would be handled here in the same manner as the veterans' home town medical care program. Headquarters for the program would be in the state office. It was also decided at the same meeting that the various specialty groups concerned should be asked to determine the average fees to be set in Minnesota for the medical procedures within their specialties.

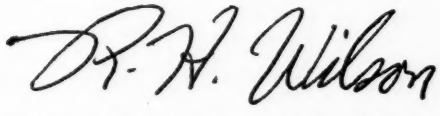
The Department of Defense sent out the official nomenclature of fees in August. This included approximately 1,400 items which are to be priced at prevailing average rates in the community.

Dependents of military personnel stationed in Minnesota who will be eligible for care under this program number 5,976.

The number of dependents of draftees and other personnel now stationed *outside* of Minnesota is unknown and Selective Service officials say they are unable to make any estimate of the figure.

The program is limited to medical care while the dependents are in the hospital but there are broad exceptions permitting diagnostic services and after care in the physician's office; also office care for injuries.

The patient will pay the first $25 of hospital expenses or $1.75 a day, whichever is greater, for a period up to 365 days for each hospital admission. The patient will pay nothing for medical services but the government will pay civilian physicians average fees prevailing in their communities as mentioned earlier. No prior authorizations are required and the fees are to be independent of either Blue Shield or welfare schedules.



President, Minnesota State Medical Association

Committee Action

Tuberculosis

Tuberculosis Sanatoria
Realistic Approach
Private Physician's Care
Elimination of Sanatoria?
Solution of Problem—Five or One Hundred Years?

The meeting of June 22, 1956, was called to order by Chairman John F. Briggs, who asked for general discussion of the problem of what to do with empty sanatorium beds.

Dr. Slater emphasized the fact that, while the new drugs are wonderful aids to treatment, none of them has yet been able to cure tuberculosis. Many patients who have been discharged as cured are coming back. He recommended that the committee take a stand that every person having an open case of tuberculosis should be in the sanatorium. The sanatorium has done a wonderful job both for the patients and for the protection of their families and communities.

Dr. Cohen said the pace of hospital treatment is different but the number of patients entering the sanatorium is the same as before. He noted, also, that prior to the era of chemotherapy there was a constant population of "good chronics," at Glen Lake. These patients never died, never got well. Now, as of three months ago, there are thirty to thirty-five patients in that category. The others have become negative, and different arrangements could be made. A report on unused beds has been made by the Trudeau Society, Dr. Cohen said, and he hopes to get mimeographed copies for the committee. Plans should be drawn up, he believes, on a logical, co-ordinated basis.

Dr. Fleming pointed to the fact that there are many cases that are missed because of inadequate follow-up and lack of public health nurses. More beds would be needed if these cases could be discovered.

Dr. Callahan agreed with Dr. Slater that every person with positive tuberculosis should be admitted to the sanatorium, but he said the situation is very different today from what it was twenty-five years ago, and drugs have had a great influence in controlling infection. Bacteriostatic qualities of the drugs have kept germs from multiplying and have removed one of the nightmares of years ago. "We have all had the experience" he said, "of having women patients apparently cured until they became pregnant. Often they would be running temperatures and would require hospitalization within two months, sometimes going on to chronic invalidism or death. With chemotherapy, the mother continues healthy and the children in most cases show no reaction to tuberculin.

It was pointed out in the discussion that the modern sanatorium is really a hospital, capable of giving full hospital care for anything that may develop. Hundreds of persons are being saved from relapses as a result of chemotherapy, and use of the drugs permits surgery that could not have been considered before. It is most impressive that patients who have had full treatment, including surgery if indicated, do not relapse as before.

Members of the committee stated that they had been impressed by the work now being done at the State Sanatorium. Although no resection surgery is done, there is an active staff and laboratory, and treatment is being carefully checked to measure effectiveness. There are three standard drugs, and the Veterans Administration has done effective work in determining how best to use them. A combination of all three, PAS, Streptomycin and Isoniazid, seems to be most effective while the patient is in the sanatorium. A different program should be followed when the patient goes home to avoid the necessity for seeing a doctor oftener than every three or four days.

The reason for the empty beds is that the patients have had surgery and drug treatment so that recurrences are cut down and there are few repeaters. Actually, since the advent of chemotherapy, the reduction in death rates and the empty beds have gone hand in hand. Individualized use of drugs in combinations have been found best to avoid development of drug-resistant bacteria, and gastric and sputum cutlures are essential to check on therapy. In the Anoka group, for example, frequent cultures were not possible earlier and patients otherwise suitable for surgery have been found, after operation, to be resistant to drugs, with poor results as a consequence. It is now possible to make use of facilities at Glen Lake and the Health Department. Laboratory studies should be carried out every three months together with proper changes in drugs, for best results.

Dr. Backus said he and his staff at Nopeming are deeply concerned with the problem of empty beds. He agreed that every person having active tuberculosis should be in the sanatorium and that changes in the handling of treatment have stepped up the tempo of bed occupancy. Reactivation has been sharply reduced and at Nopeming the number of reactivations, once one in three, has now been reduced to a small percentage. In spite of the fact that about as many new cases are being found, due to an active case-finding program, the situation has changed markedly. In 1948, there were 330 cases from St. Louis County at Nopeming. Now there are 140 cases in the sanatorium, about one-quarter of them from St. Louis County. "That means we are going to have to reduce our staff and our laboratory," Dr. Backus said, "and our treatment is going to be less effective. The situation can be viewed from two points of view. From the dollar point of view, it is good. From the point of view of the patient who has tuberculosis, it is not good because we shall not be able to give him the care he should have. Of course, the county may want to use the beds for other purposes. The question is: For what purposes? We would certainly like to know."

Dr. Barr predicted that within ten years there might be no tuberculosis sanatoriums at all in Minnesota. Patients would be handled in general hospitals just as other patients are handled, except that they might be in the hospital a somewhat longer time. There they would have the staff, laboratory and x-ray services needed for proper care. He said that in 1936 there were 4,500 beds for tuberculosis in Minnesota, which number represented a high relationship of beds to death rate in comparison with other states in the country. "We now have 1,656 beds in the state," he said, "and every sanatorium has large vacancies. At the same time, there is a terrific demand for beds for the care of older people. If some of the county sanatoriums were closed, it was thought last January that the State Sanatorium could be kept full. Real concern was expressed in the discussions at that time about the

continuance of case-finding programs carried on by the county sanatoriums. The concern was certainly laudable and we know that more case-finding has been done by the county sanatoriums than by any other agencies. On the other hand, some of our recent studies have revealed other answers to that problem, too. For instance, the routine hospital admission x-ray is a fruitful means of unsuspected case-finding, and only a few hospitals in some areas have established that program. Also, only three counties in the Crookston area, for example, have county public health nurses. But county nurses are the best agencies for follow-up and they can help greatly to take the place of the sanatoriums in case-finding. We need to screen certain population groups, such as the Gateway district in Minneapolis. But most cases are found through the routine hospital admission x-ray program.

"In any case, I think we should be honest about the situation," he said. "Sanatorium beds actually represent a small part of the answer to tuberculosis control. They represent only a stop-gap. The need today is to build sanatoriums in connection with general hospitals and not by themselves on the outskirts of towns. Not only Nopeming but Glen Lake and the State Sanatorium have serious vacancies, and it is not realistic to try to concentrate tuberculosis patients in these institutions. We are going to be obliged to use these institutions for other types of patients. When Dr. Slater leaves Southwestern Sanatorium, the sanatorium will be dead. No doctor can be found who will take his place."

Dr. Hodgson made the comment that he, personally, approves empty beds. "We might as well face the inevitable," he said. "There is no use in keeping beds that are not needed. We must face the fact that the private physician is taking care of tuberculosis patients and we should welcome the change. But where one doctor is qualified for the task, another may need education. We must educate all our doctors about the hazards involved in modern methods of treatment, and this committee is a good place to start." He said he would like to see a sign on every closed sanatorium that would read "This institution closed because the doctors who managed it were interested in the control of tuberculosis."

Dr. Jordan reported that he and Dr. Kathleen Jordan have just finished testing 16,000 children in the area of Riverside Sanatorium at Granite Falls. For years, he said, they had found no positive reactors in the first, second or third grades. But this year, there were a number of reactors among those age groups. They were children of World War II and of Korean war veterans. "Tuberculosis is not licked, and it won't be licked for years to come," he said. "And as for leaving case-finding to county nurses, I am skeptical of results. In our area, county nurses have too many reports to fill out to have adequate time for follow-up. The county nurse in our county has not yet got around to visiting a woman found in November. We are trying now to get every patient tested who goes to a doctor's office, as a matter of office routine. The average age of patients in the sanatorium was once forty years but it is now sixty-eight years, and we are practically an old folks' home. We find patients who have had various types of chemotherapy given mostly by young doctors for 'virus disease or pulmonary disease' who have never been tested. We need routine testing by doctors as well as routine hospital x-rays," he said.

Dr. Meyers recalled the history of tuberculosis control from the time of Koch. "Each time an important advance was made," he recalled, "people said 'It's all over.' Koch said it; Von Behring said it; Marfan said it. But tuberculosis is the most deceitful disease that ever attacked human beings, and it was not all over. The trouble was they did not watch long enough. Now we are in a like situation. We are drawing conclusions prematurely. Not enough time has elapsed to be certain, yet, that we have conquered tuberculosis. The other day, Lon Williams said he doubted if any of our present drugs would be used in ten years. We can't know for twenty years whether the drugs we are using now are effective for more than a year or two. We don't know, yet, whether they kill tubercle bacillae or not. I remember when we were begging for sanatoriums to cure tuberculosis. People said, 'give us the sanatoriums and we will solve the tuberculosis problem in twenty years.' Now the Interim Commission has said the problem will be solved within five years and the rate will be no more than 5/100,000. Others say the answer lies in drugs plus surgery, and there will be no problems in ten years.

"In this state, we know that 10 per cent of the people are harboring tubercle bacillae in their bodies, and some of them are going to break down. I venture to say that nobody alive today will actually see the tuberculosis problem solved. I believe we are making the greatest mistake since 1872. In 1952, I said there would be only three sanatoriums left in ten years and only one left in twenty years. Now we see ten times more displaced persons developing tuberculosis than native Americans, and we have many illegal immigrants from countries where tuberculosis is prevalent. These people do not report for treatment until they break down. On the University campus, 60 per cent of breakdowns are among foreign students. Yet these students constitute only 3 per cent of the student population. We should look at the Veterans Administration census, also.

"When the report of what we have said tonight is read twenty-five years from now, I do not want to be on the record as having said: 'Let's stop—we have conquered tuberculosis.'

"As to the sanatoriums—we do have vacant beds, it is true. And it is also true that many people are being treated by private doctors who should be in the sanatorium. Many European doctors tell us that most of their patients who enter the sanatorium are people who were thought to be cured. I believe we should hold our beds which were provided through the tremendous effort of people like Dr. Longstreet Taylor. We did get the beds, and now we are talking of abandoning them. Many of the people who are now being treated with drugs are going to break down. They will need institutional care. But if we abandon our beds, we shall not get them back again. We may set them aside for care of elderly people, now, but we should hold them for the time when the disease comes back again."

Dr. Slater said he had always opposed socialized medicine even though he worked in a state institution. He has always felt that the practicing physician is the cornerstone of tuberculosis control and he must be kept interested and informed. He said he wanted to emphasize what he had said before, that every person with an open case of tuberculosis should be in an institution. There is still a job to do in both respects.

Dr. Callahan remarked that it seemed to him unfair to invite foreigners into the country and then drop them into the laps of local counties and states which they break down with tuberculosis. He said he is heartily in favor of Dr. Slater's idea that the men in general practice should have more training and education in handling tuberculosis. He said he realized that the problem will not be solved for 100 years. At the same time he does not favor keeping sanatorium beds empty when they could be put to useful purposes. There are many tax problems in the state. The Legislature is seriously questioning the expense of caring for recipients of Old Age Assistance and of Aid to Dependent Children, and it is his hope the care of the sick patient can be kept in the hands of the medical profession without arbitrary limits as to expenditures. Use of empty beds can help solve the tax problem.

Dr. Briggs said the meeting had been planned as the start of a pilot study, only. All would agree that

(Continued on Page 693)

Medical Economics

Edited by the
Committee on Medical Economics,
Minnesota State Medical Association
George Earl, M.D., Chairman

LEGISLATIVE REVIEW OF THE 84th CONGRESS

During the two years of the 84th Congress, the Washington office of the American Medical Association analyzed and followed closely a total of 571 bills in the health fields. Twenty-five of these became law.

Once the 85th Congress convenes next January, health bills that died in committees this year are likely to be reintroduced along with many new ones. In any event bills are certain to include federal aid to medical education, federal workers' health insurance, pooling arrangements among small health insurance companies, federal aid to local public health units, mortgage loan guarantees to private medical facilities and controls over barbiturates and amphetamines.

Bills which actually became law during the past two years include:

Military Legislation

Dependent Medical Care.—(for details on how this program is to be carried out in Minnesota, please see this month's President's Letter.)

Career Incentive Pay.—Public Law 497 is directed at another Defense Department problem: how to attract and retain physicians in the Army, Navy and Air Force. To help in this program, the 84th Congress approved the career incentives bill which does the following: (1) gives all doctors in uniform including the commissioned corps of Public Health Service, an extra $50 a month after more than two years' service, $100 extra after six years and $150 a month after ten years, and (2) credits medical school and internship training periods toward future pay and promotions. These payments are in addition to the present extra $100 per month equalization pay.

Doctor Draft Extension.—One of the early health measures to pass in the first session of this Congress, P. L. 118, extended the Doctor Draft Act until July 1, 1957, Congress agreeing it was essential in order to procure enough experienced physicians to maintain high medical care standards. The law also extends for four years to July, 1959, the $100-a-month equalization pay for doctors.

Military Status for PHS.—Public Law 492 permits the President, in time of national emergency, to give the commissioned corps of Public Health Service military status.

Commissioning of Osteopaths.—Under Public Law 763, osteopaths are eligible (on a permissive basis) for the first time for medical commissions in all the military services.

Public Health Legislation

Health Amendments (Omnibus) Act.—Popularly known as the little omnibus health bill, this measure (P. L. 911) represents a compromise between what the administration sought in its omnibus proposal of more than a year ago and what the majority in Congress wanted. Its five titles provide the following: (1) extension for two years beyond next July 1 of the Hill-Burton hospital construction program, (2) grants to states, groups and individuals for research in mental health, (3) traineeship grants for public health personnel, (4) traineeships for graduate nurses, and (5) earmarked funds for practical nurse training. The original Eisenhower omnibus health bill included the twice-rejected health reinsurance fund and mortgage loan guarantees for health facilities.

National Health Survey.—To fill what its sponsors describe as a twenty-year gap in knowledge, Public Law 652 provides for special and continuing surveys of the amount, distribution and effects of illness and disability and the types of medical services furnished.

Salk Vaccine Grants.—In the first session, Congress voted $30 million for grants to the states to help finance inoculations of persons who otherwise might not receive Salk vaccine. It stipulated that the money would be available until February 15, 1956 (Public Law 377). One of the early actions of the second session was a seventeen-

month extension (to July 1, 1957) of the program (Public Law 411).

Alaskan Mental Health.—This proposal to modernize the Territory's mental health program, including construction of facilities, was passed in the House with little debate early in the second session. Then opposition developed over commitment procedures. Finally, it passed with a proviso that the territorial legislature decide on commitment procedures (Public Law 830).

Water Pollution Control.—Congress in its second session voted to make the expiring Water Pollution Control Act permanent and to authorize $50 million a year for ten years in grants to states and communities to build sewage disposal plants. The administration favored loans rather than grants. It became Public Law 660.

Air Pollution Control.—One of the few health measures to pass in the first session, Public Law 159 authorized $25 million over five years for grants to states, private groups and individuals for research, training and demonstrations in air pollution.

Mental Health Survey.—Another first session measure was Public Law 182 which authorized $1,250,000 to finance a broad three-year survey of mental health problems and existing programs. The Joint Commission of Mental Illness and Health, aided by additional grants from private sources, is now making the study.

General Medical Legislation

Laboratory Research Construction.—Public Law 835, which authorizes a three-year program of $90 million in grants to medical schools, hospitals and other non-federal institutions for laboratory facilities doing health and medical research, was one of the major measures enacted by the 84th Congress. It passed the Senate in the final days of the first session but was held up for months this year in the House while bill managers pondered the addition of federal construction grants for medical schools. The medical school aid feature was dropped in favor of further study.

National Library of Medicine.—Another milestone this session was the measure reconstituting the Armed Forces Medical Library as the National Library of Medicine and placing it for administrative purposes in the Department of Health, Education, and Welfare. When a group of Congressmen pressed for location of the library in Chicago instead of the Washington (D. C.) area, it appeared the proposal would be stymied in committee. In a compromise, Congress voted to have the seventeen-man board of regents select a site. Public Law 941 was the result.

Narcotics Control.—This measure stiffens penalties for peddlers and smugglers of narcotics and heroin. The death penalty is permissive under the act (P. L. 728) for peddling heroin to minors. Considered, but not passed, by this Congress was a bill calling for tighter controls over barbiturates and amphetamines.

Social Welfare Legislation

Social Security Amendments.—One of the most controversial measures to come before Congress in years was the Social Security bill (now P. L. 880) passed on the very last day of the second session. It includes cash payments for disability at age fifty, a proposal that slipped through the House in 1955 without public hearings and limited debate and came within one vote of being defeated in the Senate this year. Other provisions: (1) a so-called separate fund for LASI payments to workers found totally and permanently disabled at age fifty, (2) an additional ½ per cent payroll tax effective next January 1 (half to be paid by employe, half by employer) and ⅜ per cent tax for the self-employed, (3) inclusion of dentists, osteopaths, lawyers and other groups in the social security system, (4) lowering retirement age for women to sixty-two, (5) increased federal payments to the states for persons on public assistance rolls, and (6) ear-marked payments to states for the medical care of public assistance recipients.

Other Legislation

Foreign Service Dependents Medical Care.—Some 13,500 dependents of Foreign Service employes living abroad are eligible under Public Law 828 for full hospital and medical care expenses up to 120 days, with the first $35 paid by the dependent. The law also provides for federal payment of health insurance written for employes or dependents and for transportation to the nearest hospital or clinic.

World Health Assembly.—In observance of the tenth anniversary of the founding of the World Health Organization, the United States will invite the World Health Assembly to meet in this country in 1958. This is made possible through enactment of Public Law 832, authorizing $400,000 to finance additional costs of the meeting.

Donable Property.—Surplus Federal property is made available under Public Law 655 to public and non-profit institutions and agencies for civil defense work.

Study Committees on Education.—Public Law 813 authorizes funds for the President's Committee on Education beyond the High School and for similar state committees.

Tax Deferments for Research.—On top of the standard 20 per cent deduction for charitable contributions, Public Law 1022 permits another 10 per cent of adjusted gross income for certain qualified medical research organizations. *Also* P. L. 398, raising the earning limits without forfeiture of social security payments; P. L. 937, extending for another year grants to states for initiating and improving vocational rehabilitation programs; and P. L. 294, for appointment of male nurses as Reserve officers.

LIMIT RAISED ON CHARITABLE CONTRIBUTIONS TO MEDICAL RESEARCH GROUPS

Congress approved an amendment to the Internal Revenue Code to raise the charitable contribution limit for individuals from 20 to 30 per cent of adjusted gross income in the case of certain contributions to medical research organizations in the same manner as the limit for contributions to hospitals, educational institutions and churches.

The contributions to medical research organizations that will qualify under this legislation are only those made to organizations directly engaged in the continuous active conduct of medical research in conjunction with a hospital and only if such an organization is committed to spend such contributions for such research before January 1, of the fifth calendar year beginning after the date of the contributions.

MEDICAL SCHOOLS IN UNITED STATES SHOW VAST EXPANSION

With a record enrollment and projected operating budgets hitting the $111 million-mark, the nation's medical schools recently reported that 1955-56 was a year of "continuing progress."

For the seventh consecutive year, enrollment reached an all-time high with 28,639 students in seventy-six approved four-year schools and six schools which provide the first two years of medical training. The 1955 entering class was also the largest ever, with 7,686 students beginning their studies.

Sixteen American schools and one Canadian school reported the completion of construction projects costing more than $65 million.

RECENT SURVEYS REVEAL STATISTICS OF INTEREST TO PHYSICIANS

Health Insurance Coverage at All-Time High

Benefit payments designed to help individuals pay hospital and doctor bills are running 20 per cent higher this year than last, the Health Insurance Council announced recently. As of July 31, the Council estimated that some 110 million persons were covered by hospital insurance; 94 million had surgical protection; 58 million had regular medical expense coverage and seven million were insured against major hospital and medical expenses.

Physical Examinations of Physicians

During the annual AMA meeting in Chicago, physicians had an opportunity for physical examinations. The project was a joint enterprise of the AMA Section on General Practice, the American Academy of General Practice and the National Tuberculosis Association. A study of the results shows that 6 per cent of the total examined had suspected tuberculosis; cardiac findings were noted in 4.3 per cent of the x-rays; 10 per cent of the electrocardiograms were abnormal and 5.1 per cent were borderline.

Bureau Claims Medical Costs Rising

Medical costs have been rising faster than any other item on the cost-of-living index, according to the Bureau of Labor Statistics. A patient must now pay 25 per cent more for treatment than in 1950, as compared to an 8 per cent rise in the overall price index, states the report.

Study of 1956 Medical Association Dues

The Michigan State Medical Society recently surveyed each of the forty-nine constituent state medical associations (including the District of Columbia) on current state dues. The study shows that the average American physician pays between $50 and $60 per year state association dues. His county society dues range from $20 to $70 per year, depending upon whether the county or component society maintains an executive office. Detailed information on this study may be obtained from William J. Burns, executive director of the Michigan State Medical Society.

COMMITTEE ACTION—Tuberculosis

(Continued from Page 689)

tuberculosis is far from conquered, but there are empty beds and some plan must be made for using them. The problem is what plan should be made.

Dr. Cohen added that tuberculosis is, in fact, a generation disease. The effects of modern treatment will be felt in the next generation, and we are now reaping results of treatment of a generation ago. Under the present system of case-finding and treatment, tuberculosis seems to be better controlled than formerly. But the same conditions must continue to operate if the improvement is to continue.

Dr. Myers said he felt the sanatoriums should be continued as institutions for the treatment of tuberculosis, but empty beds should be converted to other uses.

Dr. Callahan added that once a patient has been in an institution he should be on follow-up for the rest of his life.

Dr. Hodgson re-emphasized the fact that there never was a time when the general practitioner was as important as now in the control of disease.

Dr. Briggs then appointed Dr. Cohen as chairman with Drs. Myers, Bridge, Fleming, Barr, Mark and James Rogers Fox on a study committee to draw up plans for use of empty sanatorium beds.

The importance of the general practitioner in the program of the future was further discussed, and Dr. Briggs appointed Dr. Sheppard to head a committee for the purpose of interesting physicians in case-finding, including routine Mantoux testing in the doctor's office. He suggested the possibility, also, of enlisting the interest of the Academy of General Practitioners in the committee's work.

The meeting adjourned.

JOHN F. BRIGGS, M.D., St. Paul, *Chairman*
J. A. MYERS, M.D., Minneapolis
R. N. BARR, M.D., Minneapolis
F. F. CALLAHAN, M.D., St. Paul
S. S. COHEN, M.D., Oak Terrace
DEAN S. FLEMING, M.D., Hopkins
CORRIN H. HODGSON, M.D., Rochester
L. S. JORDAN, M.D., Granite Falls
C. G. SHEPPARD, M.D., Hutchinson
S. A. SLATER, M.D., Worthington
R. W. BACKUS, M.D., Nopeming
JAMES BELLOMO, M.D., St. Paul
THOMAS MULROONEY, St. Paul
MTHA representative
NOPEMING SANATORIUM staff representative

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

230 Lowry Medical Arts Building
Saint Paul, Minnesota

F. H. Magney, M.D., Secretary

LICENSE OF SANDSTONE PHYSICIAN REVOKED

Re: The Revocation of the License of Frank A. Rudolph, M.D.

The Minnesota State Board of Medical Examiners on July 7, 1955, revoked the medical license held by Dr. Frank A. Rudolph, Sandstone, Minnesota. A citation for the revocation of Dr. Rudolph's license which had been issued by the Board on April 17, 1956, charged him with using indecent and obscene language in speaking to a woman patient and with making improper and indecent advances to her. Dr. Rudolph denied the charge, and a hearing was held before the Board on May 11, 1956. After hearing a number of witnesses, both in support of the citation and in Dr. Rudolph's behalf, the Board took the matter under advisement until the meeting of the Board on July 7, when Dr. Rudolph was found guilty of the charges against him.

Dr. Rudolph was born in Great Falls, Montana, on October 5, 1910. He graduated from the University of Montana State Normal College at Dillon, Montana, in 1933. According to Dr. Rudolph's testimony before the Board, he was then a teacher and coach in Boseman, Montana, for six years. Dr. Rudolph attended several summer sessions at the University of Minnesota and then enrolled in the University of South Dakota Medical School in 1939 where he received a B.S. degree of medicine in 1941. After entering the University of Vermont College of Medicine in the fall of 1941, Dr. Rudolph was granted the degree of doctor of medicine in March, 1943. Upon the completion of his internship at Swedish Hospital in Minneapolis, Dr. Rudolph was in the armed services until September, 1946.

In 1947, Dr. Rudolph began the practice of medicine at Rapid City, South Dakota, where he practiced almost four years when he left to take postgraduate training in Ohio. Dr. Rudolph returned to the practice of medicine at Rapid City in December, 1953, but remained there for only a period of approximately six months when he went to Sandstone, Minnesota, to engage in the practice of medicine. Dr. Rudolph was licensed to practice medicine in Minnesota in November, 1946. He is also licensed in Vermont, South Dakota, and Ohio.

Help Detect Occult Cancer

Doctor:

You will receive during November *a booklet* explaining the Cancer Detection Program sponsored by your State Cancer Committee. Please save this manual for use in your office.

Here is an opportunity to help increase survivors from cancer in our State through widespread detection of *pre-symptomatic cancers*. Your State Medical Association endorses this Program as a significant effort toward reduction of cancer deaths.

Join with us in a Minnesota Cancer Crusade. Help our State lead the nation in the fight against cancer.

CANCER COMMITTEE,
Minnesota State Medical Association

History of Medicine in Minnesota

THE MEDICAL HISTORY OF RICE COUNTY
(1855-1901)

ADOLPH M. HANSON, M.D.
Faribault, Minnesota

(Conclusion)

Sperry, Lyman Beecher.—Dr. Sperry was born June 8, 1840, and died suddenly at Flathead Lake, Montana, July 1, 1923.

After graduation from the University of Michigan at Ann Arbor in 1863 he practiced a year at a village near his birthplace, but he could not stand pounding the rough roads with horses and buggy. So he went to Ripon College as a professor.

In his short practice he had an interesting patient in Horace Greeley's sister and Horace himself handed him his personal check for $50 in payment of his fee.

While at Ripon he accepted the appointment as Indian Agent at Fort Berthold, Dacotah Territory from President Grant in an effort to clean up the corruption in the Indian service. The crusade was under the sponsorship of the American Missionary Faculty and others. Gen. Geo. A. Custer was military commander in that area and was ordered to help when he could. Dr. Sperry took the Chiefs to see the President at Washington and to inspect Indian Territory when the government wanted them to migrate, but when they looked it over they refused to move. He there had the chance to study the American Indian. After finishing the job, he went on the Carleton College faculty.

While at Carleton College he obtained a French manikin of the human body, which he used in class work on a trek to many neighboring lawns to illustrate his health and hygiene lectures. He invited parents of teenagers to the College, and he would take the manikin apart for their information. Many can recall those trips and the genial doctor who took the body apart.

He became interested in the YMCA movement as a useful non-denominational agency for boys and men, and for many years devoted his efforts to giving a week-long series of lectures on health and sex hygiene, ending with a travelogue, all illustrated with colored slides. In summer he traveled both at home and abroad seeking new material, conducting tours to the National Parks. His trips to and work in Glacier Park helped a great deal in having it set aside by the government as a National Park in 1909, which was twenty years after he first went into it.

He had a fine descriptive power and a keen sense of humor and drew large audiences whenever he spoke.

He was the arch-enemy of quacks and quackery, and many a young man he kept out of their clutches. He always clung to the strictly scientific line in his efforts to help others to understand life.

He continued his efforts until he was in his seventies. He then bought a home in Los Angeles, California, and lived there comfortably the rest of his life and enjoyed good health.

The key to his life was the fact that when he was a teen-aged boy he saw a slave auction in New Orleans, La., where a young mixed-blood, who was nearly white, was stripped to the skin and sold to a young man for a few hundred dollars. That made him want to help others, and he did.

(The above short biography is taken *verbatim* from a personal letter written to

the writer by Lyman Beecher Sperry's nephew, Albert Lewis Sperry, the author of *Avalanche,* dated November 25, 1953).

Sperry Glacier in Glacier Park is named after Lyman Beecher Sperry. He was the author of several books on hygiene and physiology.

Stevens, W. H.—Practiced in Faribault before 1900, but nothing else can be ascertained about him. He was not licensed in Minnesota.

Stinchfield, Augustus White (1842-1917).—Practiced in Dundas from 1872 into 1873. He had graduated from the Medical College of Maine, of Bowdoin College, in 1868 and first practiced at Verona, Lawrence County, Missouri, from 1869 to 1872. In the fall of 1873 he moved to Eyota, Olmsted County, where he remained until February, 1892, when he accepted the invitation of the Mayos to join them as a partner. He retired from this partnership in 1906 and died in Rochester March 15, 1917. An excellent biographical sketch was published "Medicine and its Practitioners in Olmsted County Prior to 1900" by Nora H. Guthrey (MINNESOTA MEDICINE, 1949-1951).

Thompson, Charles M.—Dr. Thompson was born in Scotland on July 7, 1844. He emigrated with his parents to America when ten years of age. His parents first settled in Worcester, Massachusetts, being Scotch weavers from Edinburgh. In a short time, they moved to Waterville, Maine. Young Thompson, who had "weak lungs," came to Stillwater, Minnesota, when fifteen years of age (1859). A year later he went south for his health. He came to Northfield in 1865 when he was twenty-one years old, and it was after the end of the Civil War. Had he served in the Confederate Army? (His record is silent as to that). At Northfield, he clerked in a store for two years, "studying medicine at the same time" (probably with some local physician). In 1867, he went to Ann Arbor, Michigan, and graduated from the Medical School of the University of Michigan in the spring of 1870. He returned to Northfield immediately following his graduation and established his practice there.

During the course of the next ten years he devoted one year to earnest postgraduate studies at the University of Edinburgh and at famous Old St. Bartholomew's Hospital in London. He was married to Mrs. Annie M. Smith, a widow, on August 30, 1881, at his then age of thirty-seven. He was still practicing in Northfield at the time the *History of Rice County* was published in 1882. This story of young Thompson, the delicate son of Scotch weavers, who returned to Edinburgh, the city of his childhood, as the young American M.D. to take postgraduate work (probably to earn his F.R.C.S., Edin.) intrigues the writer: the poor and sickly lad, who returned to realize his boyhood's and life's ambition to write "M.D., F.R.C.S. (Edin.)" after his name, to have it on his letterhead and at the top of his Rx blanks.

Tucker, Genevieve.—She graduated from the Homeopathic Medical College of the University of Michigan at Ann Arbor in 1880. She started to practice in Northfield in 1883 or before and was still there in 1890. She was Secretary of the Minnesota State Homeopathic Institution. Dr. Tucker was licensed in Minnesota on October 11, 1883. Between 1895 and 1905 she was in Pueblo, Colorado, around 1909 in Davenport, Iowa. In the 1920's she was located in Washington, D. C. She apparently retired from practice in the early 1930's and lived in Atlantic Highlands, New Jersey.

Turner, Granville R.—He had the distinction of being the first homeopathic physician to come to Faribault (1854 or 1855). He was half-owner of Turner's & George W. Batchelder's Addition to Faribault, platted in the year 1857. He was a real estate man with medicine as a sideline. He departed Faribault in 1857 and re-

sided somewhere in Wisconsin at the time of his death years later (no other record is available).

Wagner, Charles H.—Established his practice in Faribault before 1890. He was born in Wyocena, Wisconsin, February 12, 1853. He supposedly graduated from the Homeopathic Hospital College, Cleveland, in 1873, and was licensed in Minnesota in 1883. In 1896 he turned his practice over to Dr. Walter Henry Robilliard and moved to Minneapolis. He retired from medical practice long before he died on March 1, 1920, at the age of sixty-seven. Dr. Wagner was vice-president and director of the Northwestern States Portland Cement Company, Mason City, Iowa; the Trinity Portland Cement Company, Dallas, Texas, and the Northwestern Metal Ware Company, Minneapolis.

Ward, W. Tilliard (Tilleard).—A graduate of the Medical Department of McGill University in Montreal in 1873, he is known to have practiced in Morristown during the years 1886-1893. He was licensed in Minnesota by exemption.

Warren, F. S.—Dr. Warren was born in St. Paul, Minnesota, on May 9, 1874. Following his graduation from the Medical School of the University of Minnesota, he took his internship at the City and County Hospital (now Ancker Hospital), St. Paul, Minnesota. He started practice in Faribault, Minnesota, in 1897. He did post-graduate work at the New York Post-Graduate Hospital. After enjoying a big and successful practice for thirty-three years, he retired in October of 1930 and moved to Washington, D. C., where he died on January 20, 1945, at the age of seventy-one. During the course of the years following his retirement, Dr. Warren never lost his interest in medicine. He visited the big hospitals in the East, particularly, the New York Post-Graduate Hospital. He returned on several occasions to renew old acquaintances at Faribault and to entertain his professional brothers at an inn south of Faribault.

Williams, A. D.—Physician and Baptist clergyman, came to Minnesota in 1866 and engaged in home missionary work in Faribault. He was born in Bennington, Vermont, in 1826, graduated from the Rochester University in 1855 and the Rochester Theological Seminary in 1857. It is probable that he practiced medicine as part of his missionary work in Rice County. After 1870 he was in Brooklyn, Hennepin County, where he was pastor for two years and later practiced medicine.

Wilson, Henry L.—According to the *New Federal Union* of Rochester, Minnesota, he established himself at Dundas, where he purchased a first-class pharmacy on March 9, 1867.

Wilson, Warren.—The writer cannot do better than to quote his son, Dr. Warren Wilson, Jr., of Northfield, Minnesota:

Dr. Warren Wilson was born in Ontario, Canada, in 1863. At the early age of three, one of his elders asked him what he was going to be when he grew up, and he replied: "A doctor." Apparently, this vocation was decided upon early in life, as life on the farm didn't appeal to him even then. When he was seventeen years old he left home and went to Detroit, Michigan, where he learned the telegraphic code. He then became a telegraph operator on the Grand Trunk railroad in Michigan and Ontario. While working at this, he still firmly maintained his intention of becoming a doctor, because every pay day half of his earnings was deposited in the bank and the other half was used for living expenses. When he thought that he had saved enough money, he went to Chicago, Illinois, where he attended the Chicago

Medical College from which he graduated in 1888 after three years of medical training. During these three years, ten cents was budgeted for breakfast, which consisted of one cup of coffee and two doughnuts eaten, daily, for three years. He believed that his digestive troubles in later years were due to the rather meagre diet while attending medical school.

After finishing medical college, he started to practice in Belding, Michigan. There less than a year, his wife of only a few months died. Shortly thereafter (1889), Dr. Wilson went to Duluth, Minnesota, where he opened an office at 20th Avenue West and Superior Street. He was married the second time in 1894; and, when his second wife died in 1898, he moved to Northfield, Minnesota, where he bought the office equipment of a Dr. Schmidt, who died of pneumonia the previous winter.

Soon after his arrival in Northfield, Dr. Wilson became the physician for the State Odd Fellows Home, located in Northfield. He persuaded the Board of Directors of this organization that a hospital would be a good thing for the Odd Fellows Home and for Northfield. Following plans, which Dr. Wilson drew, the Odd Fellows built and equipped a hospital in connection with the home. This was open for use by all the doctors in the community. In a few years the Odd Fellows Board decided they did not want to operate a hospital anymore. This distressed Dr. Wilson very much, because he and the other physicians were beginning to do considerable surgery. They needed a hospital. So Dr. Wilson organized the Northfield Hospital Association with the rest of the local doctors and some of the local citizens. Stock was sold and enough money raised to buy a large residence, to remodel it, and to equip it for hospital use. Dr. Wilson was the secretary and general manager of this institution from its beginning until it was taken over by the city nearly thirty years later and until a new city-owned hospital was built. During the whole period of the operation of the Northfield Hospital Association, Dr. Wilson saw to it that it never went into debt, that all bills were promptly paid, and that there was always a little surplus in the treasury. No funds were contributed to the Association other than those raised to start the hospital. The efforts expended by Dr. Wilson in the managing of this institution were a real altruistic contribution to the Northfield community.

In 1919, Dr. Wilson took Dr. Joseph Moses into partnership. Dr. Warren Wilson, his son, later joined the group. Dr. Warren Wilson, Sr., retired from active practice in 1926; but he maintained his interest in medical affairs by his concern over the success and the welfare of the new municipal hospital of Northfield. He also had a farm, to the management of which he devoted considerable time, perhaps evoked by a nostalgic longing for the Canadian farm of his childhood. Dr. Wilson was very active for many years in Northfield's Masonic bodies and a member of the Public School Board, of which he was the secretary for a number of years. During his years of active practice, he acquired a reputation as a good surgeon, and at one time was invited to join a medical group in a larger center as surgeon. He declined the offer because he thought he would enjoy life better, independent of some large organization. Dr. Warren Wilson suffered a fatal coronary insult in 1938. He was buried in Oaklawn Cemetery, Northfield.

Wood, George Weston.—Professor of diseases of the nervous system and of Medical jurisprudence at the University of Minnesota (1883-1887), a member of the Minnesota State Board of Medical Examiners, and State Senator (1887-89), Dr. George Weston Wood was the most outstanding medical man of his day in the town of Faribault and Rice County. *The History of Rice County,* edited by Charles S. Bryant, and published in the year 1882, contains the following biography:

"G. Weston Wood, M.D., one of the leading physicians of the city, was born in Canada, in Sheffield county, Quebec, on the 8th of May, 1842. His father was a cavalary officer of some

prominence during the Canada insurrection in 1837, and was also engaged in manufacturing. G. Weston attended the Bishop's College at Lenoxville until sixteen years old, and one year later went to McGill College, where he graduated from the medical department on the 4th of May, 1863 (at the age of twenty-one). He was united in marriage on the 4th of July, 1868, with Miss Ella M. Fox. In 1873, they removed to Faribault, and one year later formed the present partnership of Rose & Wood. He has been County Coroner three terms and is now County Commissioner. He was mayor of the city in 1881, and is now surgeon of Shattuck School. They have three children, two boys and one girl."

George Weston Wood died on January 5, 1896, from leukemia, in his fifty-fourth year, after an illness of four years. Knowing the fatal nature of his affliction, he nevertheless carried on with his practice up to within less than four months of his own death, when repeated hemorrhages, their resultant anemias, and his weakness forced him into retirement. He was loved and respected by all who knew him (one or the other), for he was one of those upstanding and morally courageous men all must admire.

A medical history of Rice County would not be complete without at least a cursory history of the institutions caring for handicapped children.** It is one of the outstanding accomplishments of pioneer Minnesota that it recognized very early the care of these handicapped children as a public responsibility. From its inception the institutes for the education of the deaf, dumb, for the blind, and the feeble-minded were located in Faribault. The very beginnings go back to 1857 when the city of Faribault bought seventy acres of land and donated it to the territory as a site for a school for deaf children. The territory accepted it and the establishment of such a school was decided upon though no appropriations were voted until 1863. The sum set aside for this experimental school was only $1,500 and provided care and teaching only for indigent children. The results of the first year made such an impression that in the following year the legislature not only decided to continue the school, but repealed the indigent clause and opened it, besides to the deaf, also to all blind children of this state. In 1866 the sum of $10,000 was appropriated for a school building. The beginnings were small: in 1863 there were only eight deaf students, which number rose to twenty, twenty-three and twenty-eight during the successive three years. The first blind students were taken care of in 1866; only four in that and the following year. The establishment of the department for feeble-minded children did not materialize for many years although it had been suggested as early as 1869 and again in 1877. In 1879 the legislature authorized the Commissioners of Lunacy to select feeble-minded children from the Hospital for the Insane and transfer them to the Institute in Faribault. As this seemed unsatisfactory and an amendment to include *all* feeble-minded children was not passed until 1881, the feeble-minded department did not get under way until 1882.

The age limit for the deaf was from ten to twenty-five, but no such age limitation was placed upon the feeble-minded department. The department for the deaf always remained considerably larger than that for the blind. In 1870 the number of deaf students was sixty-one, of blind students fifteen. In 1875 the respective figures were 110 and twenty-two, and in 1880, 134 and thirty-five. One of the reasons was the fact the school for the deaf had much better and larger living quarters and classrooms than the school for the blind. In 1882, when there were 140 deaf and forty-six blind students, the institute had forty-one feeble-minded children—a small beginning, indeed, for an institution destined to become one of the largest in the state. In the 1930's the population of the deaf was consistently a little over

**Much of this history is taken from: Gioh-Fang Dju Ma, "One Hundred Years of Public Services for Children in Minnesota," University of Chicago Press, Chicago, 1948.

300, that of the blind between 100 and 130, while that of the feeble-minded (which now includes also adults) grew from 2,500 to over 3,000.

As to the men who help build up these schools, Jonathan Lovejoy Noyes was superintendent since 1866. After the reorganization in 1881 he could give his full attention to the teaching of the deaf. He was born in Windham, New Hampshire, on June 13, 1827, and graduated from Yale College in 1852. He had experience in the education of the deaf and dumb for fourteen years when he came to Faribault. He was succeeded, after serving thirty years, in 1896, by James Albertus Tate who held this position until 1924. Tate was born in Fulton, Missouri, on October 14, 1851, and graduated from Westminster College in 1873. He held the position of superintendent of the Missouri School for the Deaf before coming to Minnesota. The school for the Blind, now known as the Minnesota Braille and Sight Saving School, was under supervision of James Jabez Dow from 1875 until 1920—a period of forty-five years. He was born in Midapores, India, on February 15, 1848, where his parents worked as missionaries. He came to the United States as an infant, and to Minnesota in 1865, after serving two years with a Maine Cavalry Regiment during the Civil War. The need for the care and education of the feeble-minded had been set forth originally by Noyes, but Dr. J. H. Knight was concerned with the organization of that school from its beginning and he became its first superintendent.

And finally we wish to mention some pioneer pharmacists, who played a considerable part in the development of medical services in the county. There was not many pharmacists during the pioneer years, because many of the early physicians compounded and dispensed their own medicines and often owned and ran regular drug stores. The following list is no doubt incomplete:

Stephen Loveland Crocker came to Faribault in 1868. He was born in Genesee County, New York, December 12, 1855, and died in Denver, Colorado, on March 3, 1904.

Frank L. Glotzbach came to Minnesota in 1887 and settled in Faribault. He was born in Natrona, Pennsylvania, on August 11, 1872. In 1907 he was elected State Senator.

W. H. Stevens opened the first drug store in Faribault in 1856. He was born in Scipio, New York, on May 22, 1814. He studied medicine but it is not known whether he actually became a physician.

Acknowledgements

The writer gratefully acknowledges his obligations to the following persons, without whose friendly and helpful co-operation the house-bound invalid would have found this short medical history an impossible task: Mrs. Ina Smith (granddaughter of Dr. Nathan Marvin Bemis); the sisters Kahn; Mrs. Marie Lucile Hanson, who made many visits to the Buckham Memorial Library where the librarians put themselves out, time and again, in digging up old newsprint records for this medical history; Dr. F. R. Huxley; friends and neighbors, who furnished old books and recounted fragments of reminiscences out of the already dimming past even to them—all of Faribault; to Dr. Warren E. Wilson of Northfield; to Albert L. Sperry of Owatonna; and to the Chairman of the Historical Committee of the Minnesota State Medical Association, Dr. Robert Rosenthal.

References

Official Register of Physicians, Minnesota (1883-1890).
The History of Rice County (by Charles S. Bryant), published in the year 1882.
Nell Wood's Scrap Book (deceased wife of George Wood, D.D.S., son of George Weston Wood, M.D., also deceased).
Newspaper clippings (most of them undated).
A few physicians' cards, published as public notices in the local weekly press.
Obituaries.

Meetings and Announcements

MEDICAL MEETINGS

STATE

MINNESOTA STATE MEDICAL ASSOCIATION, 104th annual meeting, Saint Paul, May 13, 14 and 15, 1957.

NATIONAL

American College of Obstetricians and Gynecologists, fifth annual clinical meeting, Palmer House, Chicago, Illinois, November 7-9.

American College of Surgeons, sectional meeting, Hotels Lowry and St. Paul, St. Paul, Minnesota, April 8-10, 1957. Write Dr. H. Prather Saunders, Associate Director, American College of Surgeons, 40 East Erie St., Chicago 11, Illinois.

American Heart Association, 29th annual scientific session, Cincinnati, Ohio, October 26-29. Write American Heart Association, 44 East 23rd Street, New York 10, New York.

American Public Health Association, eighty-fourth annual meeting, Convention Hall, Atlantic City, New Jersey, November 12-16.

Centennial Exposition, Academy of Medicine of Cincinnati, Health Museum, Cincinnati, Ohio, February 27-March 5, 1957.

Centennial Exposition, 100th anniversary of the Academy of Medicine of Cincinnati, Music Hall, Cincinnati, Ohio, February 27-March 5, 1957.

Diseases of the Chest, ninth annual postgraduate course, Park-Sheraton Hotel, New York, New York, November 12-16.

Interstate Postgraduate Medical Association of North America, Municipal Auditorium, Cleveland, Ohio, October 22-25.

Milwaukee Academy of Medicine, symposium on immunology, Marquette University Brooks Memorial Union, Milwaukee, Wisconsin, December 1.

National Association for Music Therapy, seventh annual conference, Hotel Jayhawk, Topeka, Kansas, October 18-20.

National Society for Crippled Children and Adults, annual convention, Hotel Statler, Washington, D. C., October 28-31.

INTERNATIONAL

Inter-American Congress of Cardiology, Havana, Cuba, November 4-10. Dr. Ramon Aixala, Apartado 2108, Havana, Cuba.

Pan American Congress on Cancer Cytology, Miami, Florida, January 8-12, 1957. Dr. J. Ernest Ayre, chairman, 1155 N. W. 14th St., Miami, Florida.

Pan-Pacific Surgical Association, seventh congress, Honolulu, Hawaii, November 14-22, 1957. Write Dr. F. J. Pinkerton, director-general of the Pan-Pacific Surgical Association, Room 230, Young Building, Honolulu, Hawaii.

MINNESOTA SOCIETY OF NEUROLOGY AND PSYCHIATRY

The Minnesota Society of Neurology and Psychiatry held its regular meeting at the Town and Country Club in St. Paul on September 11. In the scientific program "A Follow-up of Patients Discharged from an In-patient Psychiatric Service" was presented by W. D. Wolking, W. Quast, Gloria Burian and Dr. Reynold A. Jensen. An inaugural thesis, "The Sexual Offender," was presented by Dr. Bernard C. Glueck, Jr.

NORTHERN MINNESOTA MEDICAL ASSOCIATION OFFICERS

At the annual meeting of the Northern Minnesota Medical Association at Alexandria on September 7 and 8, the following officers were elected for the coming year: Dr. Walter S. Neff, Virginia, president; Dr. Arnold Larson, Detroit Lakes, vice president, and Dr. C. L. Oppegaard, Crookston, secretary-treasurer.

CONTINUATION COURSES

October 22-24, 1956	Gynecology for General Physicians
November 5-9, 1956	Radiation Therapy for Radiologists
November 19-21, 1956	Fractures for General Physicians
December 6-8, 1956	Physical Medicine
January 7-9, 1957	Dermatology for General Physicians

For further information, write to the Director, Department of Continuation Medical Education, 1342 Mayo Memorial, University of Minnesota, Minneapolis 14.

COURSE IN ELECTROCARDIOLOGY

A course in practical electrocardiology will be presented December 3-7 in Houston, Texas, by Dr. Demetrio Sodi-Pallares, chief of the department of electrocardiology at the National Institute of Cardiology, Mexico City, under auspices of the University of Texas Postgraduate School of Medicine and Baylor University College of Medicine. Inquiries should be addressed to the University of Texas Postgraduate School of Medicine, Texas Medical Center, Houston 25, Texas.

HOWARD K. GRAY MEMORIAL FUND

The Howard K. Gray Memorial Fund, comprised of contributions made in memory of Dr. Gray, who was head of a section of surgery in the Mayo Clinic from 1935 until his death on September 6, 1955, is now

administered by the Mayo Association. It is governed by a formal document which provides that the income and, if necessary, the principal, of the fund be used to provide grants to fellows or former fellows of the Mayo Foundation for purposes of travel and to satisfy other expenses incident upon visits by the recipients of traveling scholarships to leading surgical centers in the United States, territories of the United States and Canada.

The recipient of such a traveling scholarship from the Howard K. Gray Memorial Fund is selected by the Mayo Association. In practice, however, such a recipient will be nominated by a committee consisting of the director of the Mayo Foundation, the chairman of the Surgical Society of the Mayo Clinic, all surgeons who serve as members of the Board of Governors of the Mayo Clinic and such other persons as may be selected to act with them.

The contributions thus far accruing to the Howard K. Gray Memorial Fund is sufficient to assure a return income that will allow the recipient of a scholarship to spend at least two weeks at some American surgical center. It is hoped, however, that contributions to the memorial fund will continue to be made, so that the length of the visit of a scholarship recipient to a surgical center can be increased to more than the present two weeks.

JACK FRIEDMAN MEMORIAL LECTURE

The first Jack Friedman Memorial Lecture will be given on Thursday, November 29, 1956, at 8:15 p.m., in the Mayo Auditorium on the University of Minnesota Campus. The lecture will be presented by Dr. Leo G. Rigler, Professor and Head, Department of Radiology, whose subject will be "The Detection of Minimal Disease by Periodic Roentgen Examination."

Dr. Friedman, at the time of his death in 1955, was considered one of the Twin Cities' outstanding radiologists. His promising career was cut short by his untimely death. The lectureship, which is to be an annual event, is sponsored by a group of Dr. Friedman's friends and colleagues.

KENNY FOUNDATION SCHOLARSHIPS

The Sister Elizabeth Kenny Foundation announces a program of post-doctoral scholarships to promote work in the field of neuromuscular diseases. These scholarships are designed for scientists at or near the end of their fellowship training in either basic or clinical fields concerned with the broad problem of the neuromuscular diseases.

The Kenny Foundation scholars will be appointed annually. Each grant will provide a stipend for a five-year period at the rate of $5,000 to $7,000 a year. Inquiries should be addressed to Dr. E. J. Huenekens, Medical Director, Sister Elizabeth Kenny Foundation, 2400 Foshay Tower, Minneapolis 2, Minnesota.

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FILMS AVAILABLE

A revised list of films available through the AMA motion picture library has been prepared and copies are available upon request from Motion Pictures and Medical Television of the American Medical Association. This catalog lists eighty-nine medical films suitable for showing to medical societies, hospital staff meetings and other scientific groups. The catalog also includes forty-five health films of interest to physicians who may be called upon to speak before lay audiences such as service organizations, Parent-Teachers' Associations, and others.